APPG on Diversity and Inclusion in STEM inquiry on equity in the STEM workforce: Submission from the British Heart Foundation

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 people from PhDs to professors as well as investing in large programme and project grants.

Introduction

1. We welcome the opportunity to contribute to the 'Equity in the STEM workforce' inquiry by the APPG on Diversity and Inclusion in STEM. Our response draws on data pertaining to the academic STEM research workforce, and focusses on evidence of ethnic/racial and gender inequalities (Question 2), and inequalities caused and exacerbated by the Covid-19 pandemic, focussing on biomedical researchers (Question 5). 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 addressing equality of opportunity and highlight relevant best practice from across the sector (Question 4 and 6).

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 using them.

Question 1: What are the demographics of STEM workers in your organisation or sector? Are there gaps in the quality of evidence, monitoring or reporting.

3. The collection of diversity monitoring data is a crucial first step to identifying where inequalities exist, and understanding who and why certain people face barriers to inclusion. However, across the STEM sector, there are currently inconsistent practices (in terms of what and how data are being collected, and subsequently being shared), making it difficult to get a clear picture of the workforce and where underrepresentation may exist.

4. To address this data gap, joined up sector action is required. Funders should come together to ensure that diversity monitoring data are being collected and shared uniformly (in line with the General Data Protection Regulations). Doing so will help build a better understanding of where inequalities persist across the sector, and will lead to more effective action to address and monitor progress. The BHF is keen to work with other major research funders to ensure that this important ambition is realised. Our response to Question 4 expands on this and highlights current best practice in this area.

Question 2: Where is there inequity across the different protected characteristics and how are different communities impacted across different:

- STEM disciplines or sector/subsectors
- types of organisation (e.g. private, public, non-profit)
- type of STEM activity (e.g. academic research, education, engagement, commercial, funding)

- job levels and/or qualification.

5. The advantages of having a diverse workforce have long been documented across other sectors, and evidence is increasingly emerging to highlight its impact within the research workforce. 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. Alongside the equity and fairness of ensuring that no group is excluded from the research workforce, the findings highlighted that researchers from under-represented groups are more likely to undertake research and ask questions that meet the needs within those groups. Ensuring the right, representative research questions are asked helps to address otherwise unmet need, and is key to reducing health inequalities experienced by under-represented groups. This issue of underrepresentation in clinical research has garnered significant attention during the Covid-19 pandemic, during which there has been low recorded participation by BAME communities in Covid-19 research, despite the virus impacting ethnic minorities more severely. The 2017 review also found that a diverse research workforce is more productive and creative, echoing findings from a cross-sector literature review carried out by the UK Government in 2013. Despite this rationale (the so-called diversity dividend), the discipline of STEM has historically suffered from a lack of diversity. the discipline of STEM has historically suffered from a lack of diversity.

6. This section is focused on evidence of racial/ethnic and gender inequalities, within the STEM workforce, the grant funding process and reported harassment and bullying. 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 which hinders policy development and limits progress in tackling inequalities in the STEM workforce. Our response to Question 4 will discuss this point in more detail.

Racial/ethnic inequality

7. Within the 2011 Census, 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.

Representation in the academic STEM workforce

8. While there has been a focus on widening access for students in recent years, researchers from Black and minority ethnic backgrounds continue to be under-represented at PhD and senior academic levels. 2020 student data from Advance HE show that while BAME representation remains relatively high among first degree Science, Engineering and Technology (SET) undergraduates and taught postgraduates (27% [178,720 of 664,140] and 25% [32,430 of 130,100], respectively). At postgraduate research level (typically lab-based study), this falls to 19% of students (7,550 of 40,755). Across all disciplines, 4% of UK postgraduate students are Black.

9. More recently, the Higher Education Statistics Agency (HESA) published its annual report providing a breakdown of the UK's academic workforce. 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 time 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".

10. 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 of the Academy of Medical Sciences (AMS)'s 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 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".

11. Racial inequalities in the most senior research roles persist right across the system, and the examples presented in this section only provide a snapshot of the broader issue. We are thankful for the commitment taken by AMS, the Royal Society, UK Research & Innovation (UKRI) and others to gather and share this information. Doing so, and therefore highlighting the extent of the issue, is the only way for the sector to understand where the problems lie and what actions need to be taken to address them.

Disparities in grant funding

12. Ethnic/racial disparities have also 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 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.

13. Recently released 2020 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 27% grant success rate, compared to 25% for Mixed ethnicity PIs, 17% for Asian PIs and 9% for Black PIs; of the 2,405 grants awarded in 2018-19, just 10 were to Black researchers.[1] The UKRI analysis also indicated that ethnic minority awardees tended to win smaller awards, with a mean research grant amount of £564k versus £670k for White PIs.

Harassment and bullying

14. 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 (Rollock, 2019), 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". These disturbing findings were echoed in a survey on research culture published by Wellcome in 2020. Survey findings highlighted that BAME researchers often felt their experiences of research had been 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%).

[1] The dataset rounds figures to the nearest 5

Gender inequality

Representation and pay gap in the STEM workforce

15. As with race and ethnicity, there is evidence of a gender disparity the more senior and experienced STEM roles become. 2020 Advance HE student data show that across the UK, 51% of first-degree SET undergraduate students are female, mirroring the general population. Representation is also high among female SET postgraduate students (55%). However, this figure falls to 45% for research postgraduates, and even further for early year and senior academic roles; just 43% of the UK Higher Education academic workforce and 23% of Professors are female (2020 Advance HE staff data). Data for Fellows also echo this trend: less than 1 in 5 of the 1,129 AMS Fellows are female and, in 2018, the Royal Society reported that just 9% of its Fellows were women (157 of 1,653). The reported underrepresentation in more senior roles has been explained as a culmination of the impact of several factors, including working hours, caring responsibilities and increased bullying and harassment experienced by women, all of which are explored below.

16. It is well documented that individuals who work part-time or take career breaks typically progress more slowly to senior positions. 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). This disparity is likely a result of increased caring responsibilities faced by women in prevailing traditional family dynamics. However, even with these different working patterns taken into account, there still remain significant gender inequalities between research salaries. Advance HE staff data show that 37% of full-time female academic staff earn over £50k per annum, compared with 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. 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.

17. 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. 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. 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. 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. 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.

Disparities in grant funding

18. There are also documented gender disparities in the proportion of applicants to UKRI research grants. Across all UKRI research councils in 2018-19, just 2,675 (29%) of the 9,245 PI applicants who reported gender were female. This figure was slightly higher for the Medical Research Council (MRC) at 35% (570 of 1,620). In both cases, the gender of a substantial number of the respondents was recorded as 'Not Disclosed'. This highlights an issue with the data collection of gender identity, in that it is limited to the binary 'Male' and 'Female' – this issue will be explored in Question 5.

19. The success rate of women in obtaining funding appears to be slightly lower than men. 2020 UKRI diversity data show that, when applying to UKRI research grants in 2018-19, the female success rate was 24% (640 out of 2,675 to apply were successful), compared to a male success rate of 26% (1,725 of 6,570 applicants).

Harassment and bullying

20. Findings have shown that women report experiencing substantially higher levels of bullying and harassment in research environments than do their male counterparts, which likely contributes to the inequalities in representation in the STEM workforce highlighted above. Wellcome's 2020 research culture report, which surveyed over 4,200 researchers (60% female, 37% male, 1% non-binary) 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).

Question 3: Where are there evidenced inclusive behaviours and policies within different organisations, subsectors, sectors and countries on:

- Recruitment; and/or
- Retention

No response.

Question 4: Are there policies or activities undertaken by the UK Government, or its agencies, that advance or inhibit equity and inclusive cultures within the STEM workforce?

- Where could policy change or sector action lead to addressing the equity of opportunity within the UK's STEM workforce?

21. In June 2020, UKRI published its first set of harmonised diversity data for all seven research councils for the past five academic years (2014-15 to 2018-19). The dataset included grant and fellowship applications, as well as doctoral student population and co-investigator data. The analysis provided valuable data, but also highlighted some worrying findings around disparities in grant funding, with ethnic minority and female awardees tending to apply for fewer awards and win smaller awards, es evidenced in Question 2.

22. These data were further developed in December 2020 when the national research funder published a detailed ethnicity analysis of its awards over the same five-year period. For the first time, this gave a breakdown of research funding success rates of different ethnic groups (Asian, Black, Mixed), rather than grouping them under the umbrella term 'ethnic minorities'. This is an important distinction, as supported by the substantial variation reported in grant award rates between these groups (highlighted in Question 2).

23. The importance of separating out data into individual ethnicity categories and its potential for dictating future efforts for addressing STEM inequality can be highlighted best by means of an example. Across all UKRI councils in 2018-19, the UKRI fellowship award success rate for ethnic minorities was 21%. However, within that category, Asian applicants had a 25% success rate, compared to 0% for Black applicants (of 20 Black applicants, none were awarded fellowships).[2] Having this level of detail in data is important because it helps funders, institutions and policymakers identify where disparities actually exist (e.g., so that they can then identify what groups they need to better engage with to understand those disparities). Accurately identifying these disparities will result in more effective policy interventions and will help the sector measure progress as it seeks to address underlying inequalities in the STEM workforce. The Equality, Diversity and Inclusion in Science and Health group (EDIS) is leading existing sector efforts in this space and, alongside Wellcome, has published draft guidance of how to obtain useful diversity monitoring data. However, to adequately address this data gap, further joined up sector action is required.

24. **As a priority, research funders should work together to agree on criteria for uniform data collection across different diversity identifiers. They should aim to collect data on (but not limited to) gender identity, age, disability status, nationality, socioeconomic status and ethnicity from principal grant applicants. These data should be collected to an adequate level of detail against these characteristics (avoiding umbrella terms such as 'BAME' or 'ethnic minority', and moving beyond binary gender categories). Funders should also agree to data sharing and reporting principles to ensure accountability is upheld (in line with the General Data Protection Regulations). To implement this across the sector will require buy in and alignment across all funders, with careful steerage and oversight from a national body, such as the UKRI. The BHF is keen to work with other major research funders to ensure that this important ambition is realised.**

Question 5: What are the impacts of COVID-19 on equity for STEM workers (including job and income security, contract type etc) in the short- and medium-term? Which communities, groups, organisations or sectors are being most impacted?

25. The Covid-19 pandemic has placed unprecedented demands on STEM researchers; however, there is evidence that certain groups have been impacted more severely than others as a result. In particular, early-career researchers (ECRs) and those looking to move between roles have been substantially affected, while pre-existing challenges and inequalities in research careers including those relating to gender, race, and region have been exacerbated.

Career stage and contract type

Immediate consequences: grant extension policies

26. The first UK-wide lockdown in March 2020 led to many research facilities having to shut and researchers being forced to work from home. A survey of over 10,000 researchers between 26 May and 9 June 2020, conducted by Vitae and funded by the Department for Business, Energy and Industrial Strategy (BEIS), found that ECRs were the hardest hit group by the lockdown. This is because ECRs typically spend a considerable proportion of their working hours conducting research in labs, while more senior researchers spend more time on activities that can be done from home, such as writing research papers or teaching (which could be done remotely during the lockdown). As a result, when labs shut, ECRs were unable to carry out their usual work and, on

[2]The dataset rounds figures to the nearest 5

average, saw a reduction of over 15 hours of lab-based research. While some of their time was repurposed towards other activities (the group saw an increase of more than 5 hours spent 'writing papers' and on 'desk-based research') many were concerned that being unable to carry out bench-side research, and the knock-on impact on publication record, would threaten future job prospects. By comparison, more senior researchers were much less impacted by the pandemic; the average time spent by established and senior researchers neither increased nor decreased by more than 5 hours on any research activity since lockdown begun. ECRs were also significantly more concerned that they would not have their contract extended compared to established and more senior researchers (42% compared to 10% and 3%, respectively).

27. To address initial concerns, UKRI committed to supporting final-year PhD students by offering 6 months of extra financial support in April 2020. However, a survey carried out by the funder in June and published in November, 7 months after its initial support package, found that 77% of non-final year students also required extensions (of an average of 5.1 months), which would cost an additional £81 million. To date, the funder's policy remains that non-final year students should speak to their supervisor about adjusting their projects in order to complete their research on time. Concerns have been raised that marginalised PhD students, including those from working-class backgrounds and minority ethnic backgrounds, would be "disproportionately affected" by UKRI's policy, and that "institutional inequalities in academia will be entrenched" as a result of the policy.

28. The BHF has been working hard to address the intense pressure the pandemic has placed on PhD students. To that end, and following consultation with our research community, we offered extensions of up to 6 months for PhD students in their penultimate years of study, and up to 3 months for those in their final year. So far, we have extended 120 PhD studentships at 28 universities at a total cost of just over £1 million.

Longer-term consequences: losing a generation of scientists

29. Medical research charities, such as the BHF, provide a major route of funding for ECRs; in 2019, members of the Association of Medial Research Charities (AMRC), funded the salaries of around 1,750 PhD students, as part of the broader support they provide to 17,000 researchers across all job levels. However, uncertainty caused by the Covid-19 pandemic has led AMRC members to forecast a reduction in research budgets by 41% (£310 million) this financial year. Modelling from the Institute of Public Policy Research (IPPR) in October 2020 found that £4.1 billion less could be invested by medical research charities in health research and development (R&D) between 2020 and 2027 as a result of financial uncertainty and changes in public giving habits caused by the Covid-19 pandemic. Reflecting medical research charities' core role in the R&D ecosystem, the modelling found that the knock-on effect of these cuts on private investment could cumulatively result in £5.3 billion less being invested in health R&D by 2027 as a direct result of lost charity income. According to the modelling, a further £2.5 billion is set to be lost over the same timeframe due to a fall in private investment resulting from adverse economic conditions (independent of lost charity investment). Up to £7.8bn of medical research investment is therefore at risk between 2020 and 2027 due to the pandemic.

30. As a result of this financial pressure, the BHF halved its 2020-21 budget for new research from around £100 million to £50 million. This, and future funding cuts caused by the pandemic, will impact our ability to fund future PhD students; between 2021 and 2024, our flagship 4-year PhD programmes will only be able to support 144 PhD students, a reduction from 176 over the previous 4 years.

31. The BHF funds the majority (55%) of all non-commercially sponsored research into heart and circulatory diseases in the UK, more than UKRI, NIHR, and other funders combined. Such substantial cuts to our research budget will have a significant impact on opportunities for cardiovascular scientists in the long term. The knock-on impact of funding concerns is already being felt keenly by researchers. A recent survey of 523 charity funded ECRs found that over 40% had considered leaving research due to funding concerns during the pandemic. Additionally, over half (280) of the respondents reported that their funding would expire by the end of 2021, and of these, two thirds (183) had been unable to secure funding to take them to the next stage in their career. Without urgent support for the sector, the UK faces losing a generation of scientists, with uncertainties around career progression and job security likely to worsen, and progress on equality, diversity and inclusion and research culture across the sector undone.

Disproportionate impact of the pandemic on certain groups

32. In November 2020, the AMS released a report that explored the impact of Covid-19 on medical research careers. The report, which was based on a workshop of 37 biomedical researchers, funders and employers, held in July 2020, highlighted that female academics, especially those with caring responsibilities were more likely to have been negatively impacted by the pandemic, with anticipated gaps in research activity and publication records resulting from the lockdown. A separate analysis by the British Medical Journal (BMJ) confirmed this finding, reporting that women had made up just 29% of first authors, and 34% of all authors, across the 1445 Covid-19 research papers had been published worldwide as of 1 May 2020. For context, a 2017 study of 1.5 million research papers found that female first authorship was seen in 40% of papers. The BMJ attributes this disparity to "competing demands from parenting, homeschooling and other caring duties, [which] are predominantly assumed by women".

33. In response to these documented disparities, hundreds of postgraduate researchers recently signed an open letter to UKRI calling for more support for those with caring responsibilities, as well as neurodiverse people, disabled people and those with ongoing health conditions. In the letter, the group of researchers pointed to the evidence suggesting that the pandemic had disproportionately affected the least privileged in society, and that this had been "mirrored in the impact on postgraduate researchers". Without adequate funded extensions, the researchers highlighted that they would be less able than their peers to publish their work, attend conferences and events and to apply for fellowships, putting them at "an immediate disadvantage in the precarious transition from PhD to early career researcher life that may have long-lasting impacts".

34. Of note, the AMS report also highlighted the disproportionate impact of the pandemic on minority ethnic researchers as an area of major concern. In particular, it warned that the impact of constraints and disruption caused by the pandemic (e.g., a reduction in outputs and potential narrowing of funding opportunities) would be more keenly felt among minority ethnic researchers who already face barriers at grant award stage (as outlined in Question 2). The report also pointed out the important role that mentorship had played in preventing feelings of isolation and demoralisation among researchers during the pandemic, stressing the historic lack of access to mentors BAME researchers face.

Question 6: What are the implications and opportunities of new policies and employer action in the next 5-10 years following COVID-19 and Brexit? What will the future impacts be for communities, groups, organisations or sectors?

35. In July 2020, the BHF attended a workshop hosted by the AMS to explore the challenges, opportunities and priorities for the biomedical research workforce caused by the Covid-19 pandemic. The subsequent report, published in November 2020, highlighted several key issues for the sector to be aware of (as discussed in Question 5) and suggested short- and medium-term actions to mitigate against these.

36. In the short term, the report called on funders to be as flexible as possible by integrating a Covid-19 'crisis memory' into their practices so that future applications and cohorts are judged fairly. This was in view of concerns raised by attendees about the lack of access to labs and difficulty generating publications during the pandemic resulting in gaps in the track record of grant applicants, especially ECRs, those on fixed-term contracts and those with caring responsibilities. This in an important recommendation which, if widely adopted by funders, will prevent the inequalities identified in Question 5 from having a long-lasting effect on the STEM workforce.

37. The report also recommended several longer-term actions for funders and employers, including calling for improved data collection to better understand the effects of Covid-19, for support to be directed at those most impacted by the pandemic, and for enhanced provision of mentoring, networking and development opportunities to address feelings of demoralisation and isolation and to promote resilience.

38. It also recognises that the central role played by biomedical research during the Covid-19 pandemic (and resulting increase in public interest in the sector) should be capitalised on to inspire future generations of talented individuals to start a career in the sector. In doing so, the sector should ensure that it presents a "credible, accessible and attractive narrative of how diverse people can excel in research careers".