Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Pay gaps in medicine and the impact of COVID-19 on doctors’ careers

Gender equality and the gender pay gap in medicine have been long-standing problems globally. Concerns about a large gender pay gap in medicine prompted the Department of Health and Social Care in England to commission an independent review, Mend the Gap: the Independent Review into Gender Pay Gaps in Medicine in England, that has now been published and which we in England to commission an independent review, the Department of Health and Social Care in England about a large gender pay gap in medicine prompted mirrored internationally; the gap is fairly easy to measure data on the gender pay gap in UK medicine are likely to be

The pay structure in UK medicine was designed for the health system of 1948, when the UK’s National Health Service (NHS) was established, and has not kept up with the changes in women’s position in society. These new data on the gender pay gap in UK medicine are likely to be mirrored internationally: the gap is fairly easy to measure in England because the NHS is a single employer. The gender pay gap in medicine review gathered evidence from the NHS Electronic Staff Record, linked to workforce and tax records, and triangulated with survey data from a randomised selection of doctors on the General Medical Council register, and in-depth qualitative interviews. Results confirm a large overall pay gap with several underlying causes. Some of the causes, such as men having, on average, been in the workforce for longer, or the fact that women are more likely to have children and to work part-time, are not a surprise. However, a less well recognised factor is the way that pay progression is structured. NHS medical pay increases in an automatic and incremental way over several years. This structure means the easiest way to accrue a large salary is to be in the system for a long time, with no breaks, resulting in widening pay gaps for those who take time off, most of whom are women. This pay gap grows with increasing age and does not narrow until age 65 years.

This review was undertaken before the COVID-19 pandemic and the impacts of the pandemic on doctors’ pay gaps are not yet fully understood. However, the COVID-19 pandemic is likely to have sharpened the disadvantageous effects of work circumstances, especially for female and Black, Asian, and minority ethnic (BAME) doctors.

The necessity to adjust working hours to manage serious overwork and the worsening imbalance of work and life during the pandemic typically results in missed experience and leadership opportunities for women and pay penalties over and above missed hours. Similarly, the severe reduction in child-care provision will have disproportionately stalled the careers of

---

1. Michelson MR. The power of visibility: advances in LGBT rights in the United States and Europe. J Polit 2019; 81: 1-5
2. Durban-Albrecht EL. Performing postcolonial homophobia: a decolonial analysis of the 2013 public demonstrations against same-sex marriage in Haiti. Women Perform 2012; 22: 156-75
3. The International Lesbian Gay Bisexual Trans and Intersex Association. Maps—sexual orientation laws. 2020. https://ilga.org/maps-sexual-orientation-laws (accessed Nov 26, 2020)
4. Shapiro CA, Sax LJ. Major selection and persistence for women in STEM. New Dir Inst Res 2011; 5-18
5. Cech EA, Waidzunas TJ. Navigating the heteronormativity of engineering: the experiences of lesbian, gay, and bisexual students. Eng Stud 2011; 3: 1-24
6. Mizzi RC. “There aren’t any girls here”: encountering heteropatriarchalism in an international development workplace. J Homosex 2013; 60: 1602-24
7. Institute of Physics, Royal Astronomical Society, Royal Society of Chemistry. Exploring the workplace for LGBT+ physical scientists. A report by the Institute of Physics, Royal Astronomical Society and Royal Society of Chemistry. 2019. https://www.iop.org/sites/default/files/2019-06/exploring-the-workplace-for-lgbtplus-physical-scientists_1.pdf (accessed Dec 10, 2020)
8. Wellcome. What researchers think about the culture they work in. Jan 15, 2020. https://wellcome.org/reports/what-researchers-think-about-research-culture (accessed Dec 2, 2020)
9. Cech EA. LGBT professionals’ workplace experiences in STEM-related federal agencies. 2015 ASEE Annual Conference and Exposition, Seattle, WA, USA; June 14-17, 2015. 26.1094.1-10
10. Hughes BE. Coming out in STEM: factors affecting retention of sexual minority STEM students. Sci Adv 2018; 4: eaaao6573
11. Freeman J. LGBTQ scientists are still left out. Nature 2018; 559: 27-28
12. Small A. Changing the culture: tackling gender-based violence, harassment and hate crime: two years on. Universities UK, 2019. https://www.universitiesuk.ac.uk/policy-and-analysis/reports/Pages/changing-the-culture-two-years-on.aspx (accessed Nov 25, 2020)
13. Stonewall. Do ask, do tell: capturing data on sexual orientation and gender identity globally. 2019. https://www.stonewall.org.uk/resources/do-ask-do-tell (accessed Dec 10, 2020)
14. Stephens H. The importance of an intersectional approach in social research. ROTA Race On The Agenda, 2016. https://www.rota.org.uk/content/importance-intersectional-approach-social-research (accessed Nov 26, 2020)
15. Stonewall. Engaging with LGBT+ advocates: a guide for UK officials working abroad. 2015. https://www.rota.org.uk/personal-political-ilga-riwi-attitudes-survey-2016 (accessed Dec 10, 2020)
The COVID-19 pandemic has highlighted inequalities in the medical workforce.\textsuperscript{6,17} Our concern is that these inequalities have exacerbated gender pay gaps in medicine, especially for BAME women. Our report makes recommendations to reduce the pay gap in medicine (panel), which will be beneficial for women and for BAME colleagues. A first step in this process is an analysis of ethnicity and intersectional pay gaps.

\textbf{Panel: Recommendations across seven themes to reduce the gender pay gap in medicine}

1. Address structural barriers to the career and pay progression of women
2. Make senior jobs more accessible to more women
3. Introduce increased transparency on gender pay gaps
4. Mandate changes to policy on gender pay gaps
5. Promote behaviour and cultural change
6. Review clinical excellence and performance payments and change accordingly
7. Implement a programme for continued and robust analysis of gender pay gaps

women in medicine. Inadequate accessible child-care for UK medics has been shown to contribute to limited career progression.\textsuperscript{8} During the COVID-19 pandemic it is likely that most accommodations to adjust to the shortage of child-care will have been made by female doctors;\textsuperscript{9,12} the implications for the female primary caregiver in dual medical career couples are probably exacerbated by both these factors.\textsuperscript{8–10}

Women doctors are already regarded by some employers as less committed than men to a career.\textsuperscript{11,12} The assumption that most women will be predisposed to prioritise family life, even if they have no children, is already damaging to their prospects of career progression.

Furthermore, the disadvantageous effects of the COVID-19 pandemic are likely to be compounded for female ethnic minority doctors. Pre-existing assumptions and stereotypes unduly affect female BAME professionals.\textsuperscript{13} Moreover, BAME doctors are more likely to be in patient-facing roles and it is possible that workplace systems and discrimination may contribute to feeling pressurised to work without adequate personal protective equipment.\textsuperscript{14,15} In the UK, deaths from COVID-19 in the health workforce are highest among BAME health-care workers.\textsuperscript{16,17}

Further investigation of our review datasets to look for pay gaps related to ethnicity suggest that the pay gap is wider for women in minority ethnic groups than for White women; the groups most affected are Pakistani and Bangladeshi women with pay gaps of 30% or more. Explanatory factors, such as age and part-time working, do not remove all ethnic and gendered pay disadvantage relative to White men. The reasons for this may include structural inequalities or discrimination.

| 1 | Shannon G, Jansen M, Williams K, et al. Gender equality in science, medicine, and global health: where are we at and what does it matter? Lancet 2019; 393: 560–69. |
| 2 | Dacre J, Woodhams C, Atkinson C, et al. Mend the gap: the independent review into gender pay gaps in medicine in England. Leeds: Department of Health and Social Care, 2020. |
| 3 | Boesveld S. What’s driving the gender pay gap in medicine? CMAJ 2020; 192: E19–20. |
| 4 | Taylor KS, Lambert TW, Goldacre MJ. Career progression and destinations, comparing men and women in the NHS: postal questionnaire surveys. BMJ 2009; 339: b1725. |
| 5 | Department of Health. Women in medicine: opportunity blocks. On the state of public health: annual report of the Chief Medical Officer 2006. London: Department of Health, 2006. |
| 6 | Hinze SW. Women, men career and family in the US young physician labor force. In: DiTommaso N, Post C, eds. Diversity in the workforce. Greenwich, CT: JAI Press, 2004: 185–217. |
| 7 | Wang C, Sweetman A. Gender, family status and physician labour supply. Soc Sci Med 2013; 94: 17–25. |
| 8 | Hinze SW. Inside medical marriages: the effect of gender on income. Work Occup 2000; 27: 464–99. |
| 9 | Johnson CA, Johnson BE, Liese BS. Dual-doctor marriages: career development. Fam Med 1991; 24: 205–8. |
| 10 | Dybyoe LN, Shanafelt TD, Balch CM, Satele D, Freischlag J. Physicians married or partnered to physicians: a comparative study in the American College of Surgeons. J Am Coll Surg 2010; 211: 663–71. |
| 11 | Van den Brink M. Scouting for talent: appointment practices of women professors in academic medicine. Soc Sci Med 2001; 72: 2033–40. |
| 12 | Fearfull A, Kamenou N, Atewologun D, Singh V. Challenging ethnic and gender identities. Equal Divs Incl Int J 2010; 29: 322–47. |
| 13 | Fearfull A, Kamenou N. How do you account for it?: a critical exploration of career opportunities for and experiences of ethnic minority women. Crit Perspect Account 2006; 17: 883–901. |
| 14 | British Medical Association. COVID-19: the risk to BAME doctors. Nov 12, 2020. https://www.bma.org.uk/advice-and-support/covid-19/your-health/covid-19-the-risk-to-bame-doctors (accessed Dec 8, 2020). |
| 15 | Mahase E. Covid-19: ethnic minority doctors feel more pressurised and less protected than white colleagues, survey finds. BMJ 2020; 369: m2506. |
| 16 | Marsh S, McIntyre N. Six in 10 UK health workers killed by COVID-19 are BAME. The Guardian, May 25, 2020. https://www.theguardian.com/world/2020/may/25/six-in-10-uk-health-workers-killed-by-covid-19-are-bame (accessed Dec 8, 2020). |
| 17 | Rimmer A. Covid-19: disproportionate impact on ethnic minority healthcare workers will be explored by government. BMJ 2020; 369: m1562. |