Equality, Diversity and Inclusion in the Membership of the Faculty of Public Health Examinations

A report commissioned by the Faculty of Public Health to examine for evidence of differential attainment in postgraduate Public Health Specialty Examinations

FACULTY OF PUBLIC HEALTH

Dr Rachel Fardon
Dr Amoolya Vusirikala
Dr Samia Latif
Dr David Chappel

November 2024

Contents

Executive Summary

Public Health is a Speciality which advocates for the principles of health equity and social justice. The Faculty of Public Health (FPH) has committed to tackling inequalities across the public health career pathway. This report is the second in a multi-phased programme of work and is focused on examining for differential attainment in the Public Health postgraduate examinations. Differential attainment refers to the gap in average (not individual) levels of performance between candidates from different demographic groups undertaking the same assessment[1, 2]. Importantly, this gap cannot be explained by a difference in ability and is therefore considered to be unfair[3]. In the UK, there is extensive evidence of differential attainment across undergraduate and postgraduate examination outcomes, and across multiple intersecting demographic characteristics[4-8].

Membership of the Faculty of Public Health (FPH) is a mandated element of the specialty training programme. In order to gain membership, candidates must pass two postgraduate examinations. The first is the Diplomate Examination (DFPH), a written examination which primarily tests knowledge and understanding of the scientific basis of public health[9]. The second is the Final Membership Examination (MFPH), an oral examination which tests the application of relevant knowledge and skills to public health practice[9]. The examinations are open to any candidate with a university degree. This includes candidates who hold a primary medical qualification. Unusually among medical specialties, the examinations are also open to candidates with a professional background other than medicine (BOTM).

This is the first study to examine for differential attainment in the outcome of passing the FPH membership examinations. We analysed ten years of national performance data for all DFPH and MFPH first exam attempts between 2012 to 2022 inclusive. We aimed to identify if demographic characteristics including age, sex, ethnicity, disability status, reasonable adjustment status, professional background, candidate status (UK Registrar, Hong Kong College of Community Medicine, or outside of UK public health specialty training), place of primary qualification and UK training region were associated with the outcome of successfully passing the DFPH and MFPH examinations on first attempt. We were unable to examine some demographic characteristics, including socioeconomic status, religion, and sexual orientation as the data has not been collected. Chinese ethnicity was analysed separately to the Asian ethnicity category, as 85.6% of candidates of Chinese ethnicity were HKCCM candidates. Overall, the analysis suggests that some demographic groups are less likely to pass the FPH membership exams on first attempt.

For the DFPH, in total 1,194 individual candidates sat the examination for the first time between 2012-2022, of which 977 candidates had complete records and were included in univariable and multivariable analysis. The outcome of interest was passing both papers on first attempt. After multivariable analysis, an attainment gap persists suggesting that the variables of increasing age, black, Asian or white other ethnicity, professional BOTM, and candidates who were not UK Registrars are each independently associated with significantly reduced odds of passing both DFPH papers on first attempt. Separate analysis restricted to UK Public Health Registrars only (n=758) showed similar results identifying older candidates, black and Asian candidates and professional BOTM candidates as having lower odds of passing both papers on first attempt.

For the MFPH, in total 813 individual candidates sat the examination for the first time between 2012-2022, of which 675 candidates had complete records and were included in

univariable and multivariable analysis. The outcome of interest was passing the exam on first attempt. After multivariable analysis, an attainment gap persists suggesting that increasing age, black and Asian ethnicity are each independently associated with significantly reduced likelihood of passing the MFPH examination on the first attempt. Separate analysis restricted to UK Public Health Registrars only was not conducted for the MFPH as UK Registrars comprised 96.2% of the MFPH cohort.

The purpose of postgraduate examinations is to differentiate between candidates with and without the necessary knowledge and skills for practice. This differentiation based on ability is necessary and appropriate. However, differentials that are connected solely to demographic characteristics are unfair and threaten stated commitments to building an inclusive, diverse and representative workforce. Whilst such inequalities exist, it is unlikely that all colleagues will feel a sense of belonging in the public health workforce. This in turn threatens our ability to effectively tackle health inequalities and to build trust with the communities we serve[9]. The significant impact of examination failure on affected individuals' physical, mental, and social wellbeing, in addition to the impact on their workplace learning opportunities, should not be underestimated.

The causes of differential attainment are multi-faceted and complex. The attainment gap is likely to result from differential experiences arising from systematic and structural inequities throughout the educational and workplace training pathway[2]. Recommendations in this report are made based on existing literature, recognising the need for further research within public health settings, co-production of interventions with colleagues with lived experience, and rigorous evaluation of implemented interventions.

Abbreviations

AOMRC	Academy of Medical Royal Colleges
AOR	Adjusted Odds Ratio
ARCP	Annual Review of Competence Progression
BOTM	Background Other Than Medicine
CASC	Clinical Assessment of Skills and Competencies
CCT	Certificate of Completion of Training
DAC	Differential Attainment Champions
DFPH	Faculty of Public Health Diplomate Examination
EDI	Equality, Diversity and Inclusion
EEA	European Economic Area
ES	Educational Supervisor
FPH	Faculty of Public Health
GMC	General Medical Council
HEFCE	Higher Education Funding Council for England
HKCCM	Hong Kong College of Community Medicine
HoS	Head of School
IMG	International Medical Graduate
MFPH	Membership of the Faculty of Public Health Examination
MRCGP	Membership of the Royal College of General Practitioners
MRCS	Membership of the Royal College of Surgeons
NHSE WTE	National Health Service England Workforce Training and Education
OSCE	Objective Structured Clinical Examination
OSPHE	Objective Structured Public Health Examination
POLAR	Participation Of Local Areas Classification
SEB	Statutory Education Bodies
SIG	Special Interest Group
TPD	Training Programme Director
UKPHR	United Kingdom Public Health Register

Author Details

Dr Rachel Fardon is an ST4 Public Health Registrar based in Greater Manchester with a background in medicine. At the time of writing this report she was a Trustee for Widening Participation Medics Network, a Community Interest Company working to build an inclusive and equitable medical workforce that represents the community it serves.

Dr Amoolya Vusirikala is an ST5 Public Health Registrar based in London with a background in medicine who has completed the UK Field Epidemiology Training Programme.

Dr David Chappel (FPH Academic Registrar) and Dr Samia Latif (FPH Assistant Academic Registrar) have supervised this project, providing advice and reviewing report drafts.

1. Introduction

Public Health is a specialty committed to advocating for the principles of health equity and social justice. It is imperative that we confront and address the inequities and biases within our own profession in order to meaningfully tackle health inequalities and build trust with the communities we serve[9]. Building an inclusive public health workforce, which is representative of our wider society, has been identified as a priority for action by numerous UK public health bodies[10-12]. The Faculty of Public Health (FPH) has expressed its commitment to becoming actively anti-racist through its Anti-Racism Framework[13], and to tackling inequalities across the public health career pathway through both the Board and the Education Committee, as well as through its Equality, Diversity and Inclusion (EDI) Committee and EDI Special Interest Group (SIG). This includes a multi-phased programme of work to look at public health specialty training through a diversity and inclusion lens.

Phase One of this work involved reviewing the recruitment processes into the specialty training programme and has been completed by Fran Bury and Richard Pinder[14]. In total, 2252 applications in recruitment cycles between 2018 and 2020 were analysed, alongside a separate analysis of the 984 applications in the 2021 recruitment cycle. The report identified that some demographic groups are significantly less likely to be successful in recruitment to Public Health specialty training. Specifically, black candidates were 90% less likely to successfully pass the psychometric testing at the assessment centre stage compared to white candidates, with Asian candidates 30% less likely to pass[14]. In addition, candidates from a background other than medicine (BOTM) were 60–70% less likely to progress from the Assessment Centre compared to candidates from a medical background[14]. Older candidates were also less likely to progress at both the assessment and selection centre stages. Recommendations for action to address the differential attainment evidenced at the recruitment stage can be read in the report[14].

Phase Two involves reviewing the specialty training programme itself, which is the primary training pathway for future Public Health Consultants in the UK. This phase of work will be examining public health training in all four countries of the UK. It is important to recognise that the UK Public Health Register (UKPHR) offers a second pathway to specialist registration through a retrospective portfolio assessment route[15]. Similarly, the General Medical Council (GMC) offers a portfolio pathway for doctors who have not completed a GMC approved programme of training and wish to apply for specialist registration[16]. However, this phase of work focuses solely on the specialty training programme, which is overseen by the FPH.

Phase Two comprises three sub-projects. The first of these sub-projects, the subject of this report, will review whether differential attainment is present in the Public Health postgraduate examinations. Future work will look to develop a baseline demographic profile of Public Health Registrars in the UK, and to examine for evidence of differential attainment in progression through training and in the Annual Review of Competence Progression (ARCP) outcomes. Phase Three of the project will subsequently examine consultant appointments and career progression. Ultimately the programme of work seeks to understand if, at what stage, and why differential attainment exists throughout the public health specialty training programme, in order to make recommendations for action.

2. Differential Attainment in Postgraduate Medical Examinations

2.1. What is Differential Attainment?

Differential attainment refers to the gap in average (not individual) levels of performance between candidates from different demographic groups undertaking the same assessment[1, 2]. Importantly, this gap cannot be explained by a difference in ability and is therefore unfair[1]. Differential attainment exists within and outside of medicine[5]. In the UK, there is extensive evidence of differential attainment across undergraduate and postgraduate medical education outcomes, and across multiple intersecting demographic characteristics[1, 2].

Differential Attainment in UK Undergraduate First Degrees

All candidates sitting the public health specialty examinations are required to have obtained a university degree or equivalent qualification. As such, differential attainment in UK undergraduate degree outcomes will affect the pool of applicants eligible to sit the postgraduate Public Health exams.

There is evidence of an attainment gap at first-degree level by several demographic characteristics. In brief, among full-time university students in England in 2020/21[17]:

- **Ethnicity:** White students had the highest level of attainment, although aggregated data may hide differential attainment between ethnic groups. The proportion of black students achieving a first or upper second degree was 17.5% lower than the proportion of white students. The attainment gap between Asian students and white students was 5.8%.
- **Disability:** Students who reported a disability were 1.0% less likely to achieve a first or upper second-class degree than students who did not report a disability.
- **Age:** Students aged 21 and over were 9.5% less likely to achieve a first or upper second degree than those aged under 21.
- **Socioeconomic status:** There were clear inverse links between deprivation and attainment. Students from the most deprived IMD quintile were 14.8% less likely to achieve a first or upper second-class degree than students from the least deprived IMD quintile.

Differential Attainment in UK Postgraduate Medical Examinations

Differential attainment continues in postgraduate UK medical exams across specialties. The largest body of evidence demonstrates differential attainment by ethnicity, with doctors from minoritised ethnic groups less likely to successfully pass recruitment processes, postgraduate exams and to achieve satisfactory ARCP outcomes compared to white doctors[1, 18-22]. There is also evidence of differential attainment by age, gender, socioeconomic status, disability, and place of primary medical qualification across UK postgraduate medical examinations[18, 23, 24]. A recent report by the GMC has enabled more detailed analysis of the intersections between ethnicity and other demographic characteristics in relation to postgraduate exam outcomes across UK medical specialties[25].
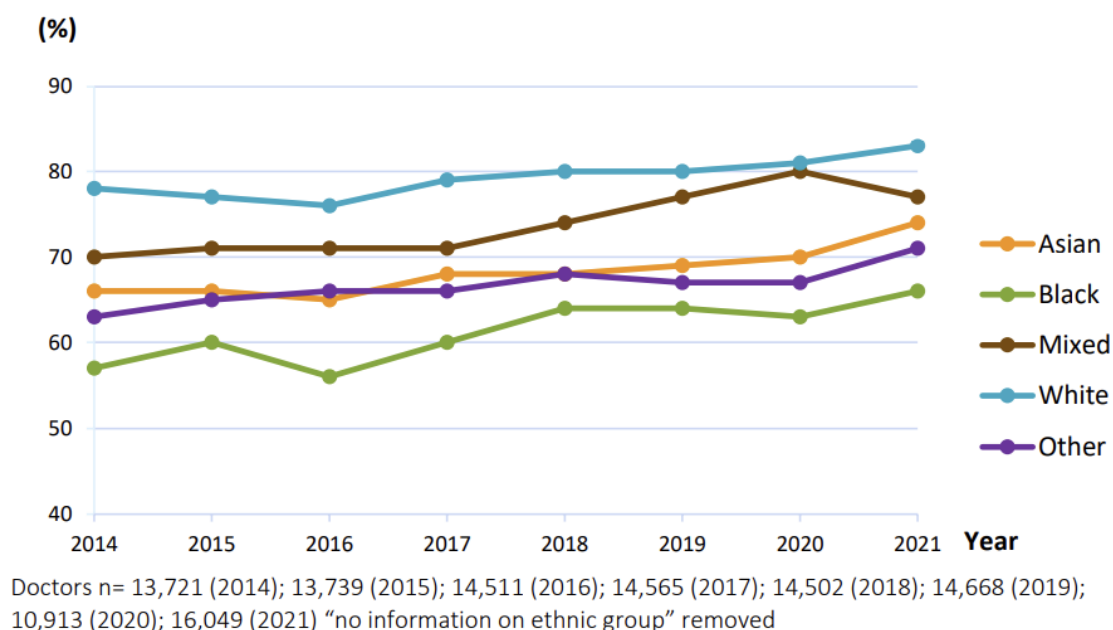
Interested readers are encouraged to refer to the GMC report for more nuanced analysis. Some of the key findings as relevant to this report are summarised below.

Ethnicity

Across all medical specialties black doctors are 18% less likely to pass their postgraduate exams compared to white doctors, as summarised in Figure 1[25]. For Asian doctors there is an 11% difference in pass rates compared to white doctors[25]. Differential attainment between ethnic groups may be masked by the aggregation of data into five categories. Notably this attainment gap has not significantly reduced over the past seven years.

Figure 1: Specialty exam pass rates for UK trained doctors by ethnic group, 2014-2021.

Doctors n= 13,721 (2014); 13,739 (2015); 14,511 (2016); 14,565 (2017); 14,502 (2018); 14,668 (2019); 10,913 (2020); 16,049 (2021) "no information on ethnic group" removed

Source: GMC (2023)[25]

Ethnicity and Place of Primary Medical Qualification (PMQ)

At a group level, doctors who qualified overseas are more likely to fail UK postgraduate examinations than UK qualified doctors[26]. Between 2014-2022, doctors who qualified outside of the UK were on average 26% less likely to pass their specialty exams compared to doctors who qualified in the UK[25]. Furthermore, black and Asian doctors who qualified overseas are less likely to pass their specialty exams compared to white doctors who also qualified overseas.

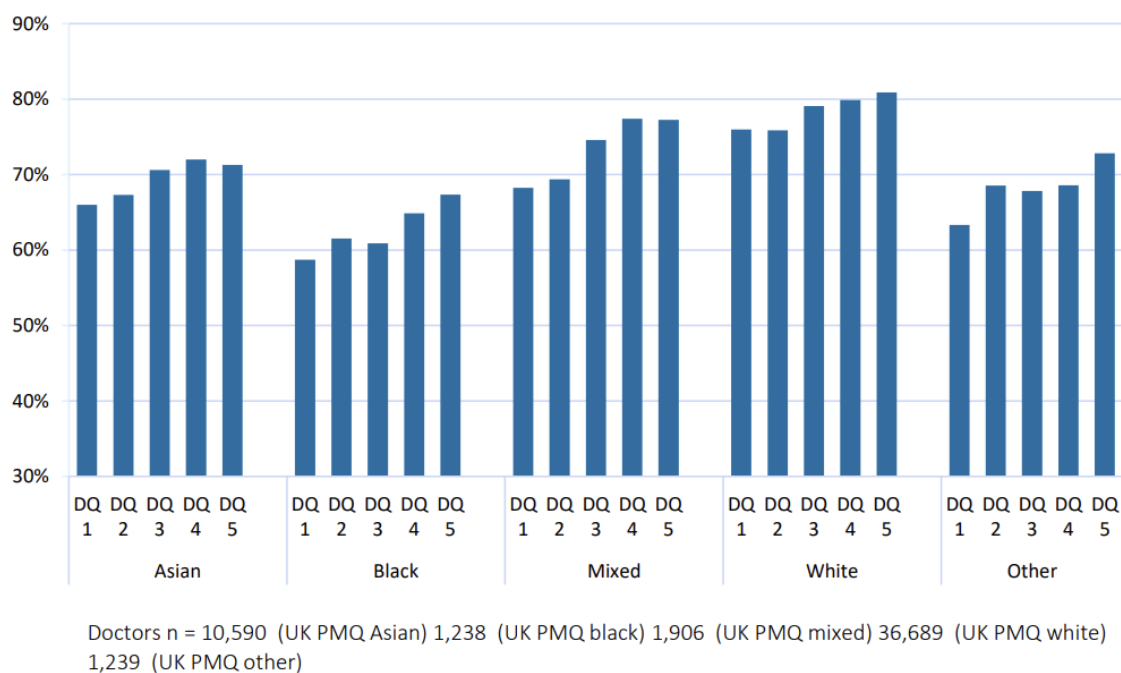## Ethnicity and Disability

Doctors who have declared a disability on average had a 4% lower specialty exam pass rate than doctors who have declared they have no disability in 2021[25]. There are notable differences in the disability reporting rates between UK trained doctors and doctors who trained overseas. The lowest reporting rates are among IMG doctors from Asian and black ethnic groups[25].

Ethnicity and Socioeconomic Status

Medicine is known to be a profession with relatively limited diversity by socioeconomic status. In 2021, only 7% of doctors sitting specialty exams had lived in an area designated as deprivation quintile 1 (most deprived) at the time of applying to medical school, compared to 39% who lived in a quintile 5 area (most affluent)[25]. In 2021, GMC data showed an average 10% difference in exam pass rates between doctors from the poorest and most affluent areas[25].

However, the proportion of doctors from each deprivation quintile varies by ethnicity. UK trained black doctors (58%) and UK trained Asian doctors (34%) are more likely to be from deprivation quintiles 1 and 2, compared to UK trained white doctors (13%)[25]. When looking at the intersection between socioeconomic status and ethnicity, black doctors have lower pass rates than colleagues of all other ethnicities across all deprivation quintiles, as demonstrated by Figure 3[25]. For example, among doctors from the most affluent background, the specialty exam pass rate is 14% higher for white doctors compared to black doctors[25]. The difference is 17% between white and black doctors from the most deprived backgrounds[25].

Figure 2: Average % specialty exam pass rate for doctors trained in the UK, by ethnic group and deprivation quintile (at the point of application to medical school) 2014-2021

Doctors n = 10,590 (UK PMQ Asian) 1,238 (UK PMQ black) 1,906 (UK PMQ mixed) 36,689 (UK PMQ white) 1,239 (UK PMQ other)

Source: GMC (2023)[25]

2.2. What are the Causes of Differential Attainment?

Early theories that differential attainment may result from biased examiners have since been challenged by research demonstrating a lack of bias in examiner marking[27], and persistent differential attainment even in machine marked multiple choice examinations[28, 29]. Theories that differential attainment may result from individual-level learner deficits have also been disproven, as gaps remain after controlling for factors such as prior attainment, study habits,

and personality[29, 30]. Interventions which focus on addressing perceived student deficits risk stigmatising students, without narrowing the gap in outcomes[2, 29].

Instead, research suggests that differential attainment in examination outcomes is likely to be a consequence of systematic and structural inequities in the distribution of privilege and power[2]. As such, it has been suggested that a change in terminology from 'differential attainment' to 'differential awarding' would better focus attention on institutional responsibility to initiate systematic and structural change[2]. For categorisation purposes in this report, the terms 'minoritised' and 'minoritisation' are used, defined by Selvarajah et al. (2020) as "individuals and populations, including numerical majorities, whose collective cultural, economic, political and social power has been eroded through the targeting of identity in active processes that sustain structures of hegemony."[31]

Mountford-Zimdars et al.'s 2015 report, commissioned by the Higher Education Funding Council for England (HEFCE), explored the causes of differential attainment in UK higher education[5]. The report identified that factors which influence differential student outcomes operate at three levels[5, 25]. At the macro level, these factors include the structure of the national higher education system and the sociohistorical and cultural structures embedded in wider society. At the meso level, student outcomes are determined within the social contexts created by individual institutions such as universities. At a micro level, day-to-day interactions between individual staff and students influence student outcomes. Within those three levels, four explanatory factors were identified, which affect the learning experience of minoritised students, and thereby result in the outcome of differential attainment[5]. These are:

- **Curricula, teaching and assessment practices:** Students from different groups reported different levels of satisfaction with the inclusivity of the curriculum and of teaching and assessment processes. Qualitative research within the report recognises that teaching and assessment practices have historically been designed and constructed in line with the social and cultural backgrounds of academic staff. This may differ from the backgrounds and experiences of current students, resulting in curricula that are not inclusive. The potential for hidden curricula to contribute to differential attainment was also highlighted, with some rules or values left implicit and unspoken, disadvantaging some students within the learning environment.

- **Relationships:** Students sense of 'belonging' was identified as a key determinant of outcomes, particularly for minoritised ethnic groups. When students did not feel a sense of belonging, this could manifest in self-reliant approaches to study, with a lesser sense of entitlement to additional support, and difficulty learning the rules of the higher education game. A lack of role models among higher education staff and peer support from social networks were also identified as factors contributing to a reduced sense of belonging. Conversely, where these factors were present it could improve the learning experience for minoritised students.

- **Social, cultural and economic capital:** Students from different demographic groups experienced higher education differently. Higher education systems and hidden curricula could be difficult to navigate without social and cultural capital. Financial stresses and additional responsibilities, such as caring roles, could also hinder students learning experiences.

- **Psychosocial and identity factors:** Students sense of feeling supported and encouraged in their daily interactions could facilitate learning, whilst feelings of alienation could limit learning and attainment. Students' experiences of stereotyping, direct discrimination and micro-aggressions were identified as contributors to differential attainment.

A further programme of research entitled "Fair Training for All" commissioned by the GMC in 2016 aimed to explore the causes for postgraduate differential attainment among UK doctors from minoritised ethnic groups, and IMG doctors[6]. The research involved qualitative focus groups and interviews with doctors across several specialties and geographic regions in England and Wales. Public Health was not one of the included specialties. The study identified that postgraduate medical training posed risks to doctors from all ethnic groups and both UK trained and IMGs. However, the study identified 12 additional risk factors which increased vulnerability to differential attainment among UK graduates from minoritised ethnic groups and IMGs[6]. These 12 risk factors were interrelated and overlapped the four categories identified by Mountford-Zimdars et al. They are summarised in Figure 3.

Figure 3 – Table summarising the risk factors and vulnerability processes identified in Woolf et al.'s "Fair Training Pathways for All" (2016)[6]

Risk factors and vulnerability processes affecting both BAME and IMG doctors	Risk factors and vulnerability processes particularly affecting IMGs
Poorer relationships with seniors and problems 'fitting in' at work can lead to fewer learning opportunities, lower confidence and increased chance of mental health problems.	Inexperience with UK assessments, recruitment, UK cultural norms including communication and National Health Service/work systems.
Perception that unconscious bias in recruitment, ARCPs, and at work can lead to poorer outcomes, as can anxiety about potential bias.	Cultural differences can impede relationships with colleagues and potentially patients, because of unfamiliarity with UK cultural norms, a feeling of not being understood by UKGs and because trainers can lack confidence in IMGs' prior training.
Poorer performance in exams and recruitment can mean less autonomy in job choice, increased likelihood of being separated from family and support networks, and increased chance of mental health problems. Failing exams can lower confidence and resits can be felt to interfere with workplace learning.	Lengthy time to learn cultural norms.
	Potential stigma of supplementary help.
Fear of being labelled as problematic can impede trainees reporting problems, including perceived racism.	Anxiety about increased probability of exam failure.
Potential for lack of recognition from trainers about environmental stressors, especially because within medicine there is a belief that failure results from lack of motivation or ability.	Visa difficulties and costs, and ineligibility for jobs can reduce training opportunities.
ARCP, Annual Review of Competence Progression; BAME, black, Asian and minority ethnic; IMG, international medical graduate; UKG, UK graduate.	

Source: Kelly & Sankaranarayanan (2023)[1]

2.3. Why should Differential Attainment in Public Health examinations be addressed?

The purpose of postgraduate examinations is to differentiate between candidates with and without the necessary knowledge and skills. This differentiation based on ability is necessary and appropriate. However, differentials that are connected solely to demographic characteristics are unfair. The social justice argument for addressing differential attainment is therefore clear. At the individual level, differential attainment in public health postgraduate exams risks penalising some groups of candidates. Firstly, through additional financial expense to re-sit exams. Secondly, as re-sit exams also confer a time and energy cost to individual candidates, interfering with workplace learning and a sense of work-life balance[6].

Delayed progression through key training milestones may hinder individual career progression and affect self-confidence in the workplace[6, 22]. As such, there is also an efficiency argument for addressing differential attainment given both the impact on training delivery, and the workplace innovation that a diverse workforce delivers[32]. Finally, the stress of exams may be compounded for candidates from minoritised groups with the knowledge that they are statistically less likely to pass compared to other colleagues[6].

Ultimately, inequalities resulting from differential attainment in postgraduate exams threaten stated commitments to building an inclusive, diverse and representative workforce. Whilst such inequalities exist, it is unlikely that all colleagues will feel a sense of belonging in the public health workforce. This in turn threatens our ability to effectively tackle health inequalities and to build trust with the communities we serve[9]. Understanding any differential attainment that may exist in the public health postgraduate exams is a necessary step to inform meaningful action to address such inequalities.

3. Membership of the Faculty of Public Health Examinations

In order to gain Membership of the FPH, two postgraduate examinations must be passed. The first is the Diplomate Examination (DFPH), a written examination which is primarily a test of knowledge and understanding of the scientific basis of public health[33]. The second is the Final Membership Examination (MFPH), an oral examination which tests the application of relevant knowledge and skills to public health practice[33]. The DFPH is currently delivered as an online assessment, while the MFPH is a face-to-face assessment. However, over the period of this study both examinations have been delivered in both formats due to the impact of the COVID-19 pandemic.

Responsibility for setting and maintaining the public health specialty training curriculum and for monitoring and maintaining the examinations sits with the FPH Education Committee[34]. Additionally, the Diplomate Examination Development Committee (DEDC) oversees the development of the DFPH, while the Final Membership Examination Development Committee (MEDC) oversees the MFPH[34]. Individual candidates are responsible for their own preparation for the exam. The majority of candidates are Public Health Registrars, who have gained entry to specialty training programmes through a competitive recruitment process. At a national level, training programmes are overseen by Statutory Education Bodies (SEB) in England, Northern Ireland, Scotland, and Wales, with regional training programmes overseen by a Training Programme Director (TPDs) and/or Head of School[35]. Further details on the arrangements for all specialty training programmes can be found in the Conference of Postgraduate Medical Deans (COPMED) Gold Guide (9th edition 2023)[36]. Candidates who are Public Health Registrars will receive additional support during their examination preparation from their Educational Supervisors, TPDs and Head of Schools within their regional training programmes. However, this is not a standardised offer and variation across regions exists.

The examinations are open to any candidate with a university degree. This includes candidates who hold a primary medical qualification. Unusually among medical specialties, the exams are also open to candidates with a professional background other than medicine (BOTM). These candidates will have completed a university degree or have equivalent qualifications and/or experience approved by the Education Committee[37]. There are three main categories of candidates who sit the exams:

- **UK Registrars:** The majority of candidates sitting both the DFPH and MFPH exams are UK Registrars. These candidates are on the five-year public health specialty training programme to become a Public Health Consultant. Most commonly, Registrars will first sit the DFPH exam in their second year of the training programme (ST2) and the MFPH in their third year of the training programme (ST3)[35]. Approximately half of candidates have a professional BOTM, and half have a medical background.

- **Hong Kong Registrars from the Hong Kong College of Community Medicine (HKCCM):** The HKCCM delivers a public health speciality training programme in Hong Kong. This is a medical specialty, so all Hong Kong Registrars have a medical professional background. Hong Kong Registrars regularly sit the DFPH exam as a mandated part of their training programme. However, the HKCCM delivers their own part two examination which Hong Kong Registrars must pass as part of their training

programme. It is therefore much less common for Hong King Registrars to sit the MFPH examination.

- **Outside of public health specialty training**: All other candidates who are not on the UK or Hong Kong public health specialty training programmes are categorised in this group. This can include candidates from a medical background, both outside of any training programme, and those in foundation training or other specialty training programmes. It can also include candidates from a professional BOTM who may be working in public health roles. Some of these candidates may be seeking specialist registration through the UKPHR portfolio route. Candidates outside of the public health speciality training are more likely to sit the DFPH exam (which can also be sat internationally) than the MFPH exam. Rarely candidates who are not Registrars on the HKCCM training programme have sat the DFPH from Hong Kong and have been categorised under the "outside of public health specialty training" category.

3.1. The Faculty of Public Health Diplomate Examination (DFPH)

DFPH Exam Structure and Syllabus

The written DFPH examination (formerly called the Part A exam) is primarily a test of knowledge and understanding of the scientific basis of public health[33]. Since 2020 the exam has been delivered online. It consists of two papers, sat over two days. In Paper I candidates must answer ten compulsory short-answer questions which primarily test knowledge. There are two questions from each of the five sections of the syllabus:

- **Research Methods:** including basic and clinical sciences research methods, epidemiological and statistical methods, health needs assessments, and evaluative technique.
- **Disease Prevention and Health Promotion:** including health promotion, screening, communicable disease and environmental hazard control and social politics.
- **Health Information:** including population and disease data and health intelligence.
- **Medical sociology, social policy and health economics:** including concepts of health, wellbeing and illness and the aetiology of illness, healthcare, equality, equity and policy and health economics.
- **Organisation and management of healthcare:** including individual and team development, organisational structures and functions, management and change theories, policy and strategy development and implementation, health and social service quality, and theoretical approaches to finances.

In Paper II candidates are tested on their public health skills. These skills include the design and interpretation of studies, data processing, presentation and interpretation, and written communication. This paper is split into two parts. Paper IIa involves the critical appraisal of a journal article and questions on its application to a specific public health problem. Paper IIb assesses data interpretation skills with five compulsory sections covering different parts of the syllabus.

Standard Setting and Marking Process

Since January 2017, a modified Angoff approach to standard setting has been implemented for the DFPH exam[38]. This involves a panel of standard setters who judge the mark they would expect a minimally competent candidate to achieve on each individual question. The marks are then collated across all standard setters and the mean value forms the pass mark for that question. Each question therefore has its own pass mark. The sum of these individual question pass marks then forms the overall pass mark for each paper.

DFPH exam papers are anonymised and marked by independent examiners. In total 14 examiners are involved in marking the examination scripts from each DFPH sitting and each script is double marked. For Paper I two examiners each mark two questions independently against the mark scheme. For Paper II, two examiners each independently mark Paper IIA, and two different examiners each independently mark Paper IIB against the mark scheme. After both examiners have completed their marking, they are supplied with the pre-determined pass mark for each question and the marks of their co-examiner. Each pair of examiners then discusses and compares their marking to reach a set of agreed marks for each exam script. Further detail on the rules of the marking process can be viewed on the FPH website[39]. The final mark on each paper for each candidate is individually discussed and agreed at the Examinations Board meeting.

The DFPH marking algorithm can be found in Appendix Figure A1. In short, candidates must pass both Paper I and Paper II separately in order to pass the DFPH overall. Candidates who pass one paper but not the other can bank the paper they have passed, so they do not need to re-sit this paper again.

- To pass Paper I candidates must:
    - Score the agreed Angoff set pass mark for paper I
    - Pass at least 7 out of 10 questions
- To pass Paper II candidates must:
    - Score the agreed Angoff set pass mark for paper II
    - Pass at least 5 out of 9 questions across sections A & B
    - From March 2023 onwards – pass at least 2 questions in each paper

Results and Feedback

Since June 2017 the exam questions have been kept confidential to build up a closed question bank. For both papers candidates receive their individual mark and the pass mark for each question. They also receive an overall score and the overall pass mark for both Paper I and Paper II. Candidates do not receive individual feedback on their exam performance. General feedback is provided after each exam sitting through examiners comments published on the FPH website.

3.1. The Final Membership Examination (MFPH)

MFPH Exam Structure and Syllabus

On successful completion of the DFPH examination, candidates are eligible to sit the MFPH. The MFPH uses an Objective Structured Public Health Examination (OSPHE) format to test

candidate's ability to apply relevant knowledge and skills to public health practice[40]. There are six role play scenarios, each lasting eight minutes with a further eight minutes of preparation time. The scenarios cover health protection, health improvement, healthcare and data topics across different settings. The examination is held face-to-face, except for the period of November 2020 to April 2022 when the examination was held virtually due to COVID restrictions.

Standard Setting and Marking Process

For every station in the examination, a role player and an examiner assess each candidate's demonstration of the same five competency areas against marking guidelines:

1. Presenting communication skills (verbal and non-verbal).
2. Listening and comprehending communication skills (verbal and non-verbal).
3. Assimilating relevant information from a variety of sources and settings and using it appropriately.
4. Demonstrating appropriate reasoning, analytical and judgement skills and giving a balanced view.
5. Handling uncertainty, the unexpected, challenge or conflict.

Candidates are graded for each competency on a scale from A-E, with A being excellent, B being good, C being adequate, D being just below adequate and E being poor. These grades are subsequently converted into numerical scores and combined to produce an overall exam score and an average score for each of the five competency areas. A borderline adjustment process is also used when collating final marks to enable all stations to have equal weighting. The overall marks are shared with the Chief Officer and after independent review by an external educationalist, ratified at the Examination Board. The MFPH Results Checklist can be found in Appendix Figure A2, but in summary to pass the MFPH candidates must:

- Score satisfactory or above as an average for all competencies AND
- Score satisfactory or above on each competency for at least three stations

Results and Feedback

The two possible outcomes of the MFPH are pass or fail. No part of the MFPH can be banked. In addition to the pass/fail outcome, candidates receive their average scores for each competency.

3.2. Reasonable Adjustments Process

The FPH Reasonable Adjustment Policy outlines the arrangements that can be made to reduce the risk of candidates with a disability, long-term condition, or other special circumstances being substantially disadvantaged in the examination process[41]. The Assistant Academic Registrar is responsible for considering requests for adjustments to the FPH examination conditions. Figure 4 gives examples of some of the reasonable adjustments available, although each request is looked at on an individual basis.

Figure 4 – Table summarising examples of reasonable adjustments available to candidates sitting the DFPH and MFPH examinations

DFPH	MFPH
- Additional Time - Rest Breaks - Use of voice-activated software - An additional bathroom break	Additional Time

Source: FPH (2023)[41]

4. Methods

4.1. Data Sources

Data extracts were provided to the project team by the FPH Exams Team. These were anonymised to protect individual candidate's confidentiality and restricted only to data necessary to address the research question, in line with data protection requirements on data minimisation. One main dataset was provided, including candidate-level demographic and performance data for all DFPH and MFPH exam sittings across the ten years from 2012 to 2022 inclusive. A separate dataset was subsequently identified which included the place of primary qualification for candidates from 2018-2022. Data was stored securely in-line with local information governance requirements. Additional demographic variables which were not collected by the FPH exam team and therefore could not be examined in this analysis included sexual orientation, religion, socioeconomic status, less than full time (LTFT) training status and caring responsibilities.

The data extract included sex, age, ethnicity, candidate status (UK Registrar, candidate outside of public health speciality training or HKCCM), Registrar professional background (medical vs BOTM), disability, exam reasonable adjustment approved and requested and year of exam sitting. DFPH exam outcomes had been collected as a pass/fail outcome for each paper. As a result, more detailed analysis of performance by overall score or by sections within the DFPH exam was not possible. MFPH exam outcomes were collected as a pass/fail outcome for each paper. For MFPH exam sittings from 2019-2022, unweighted average scores were available for analysis.

The exam data was passed to the project team, who cleaned, coded and collated them into the following datasets for analysis:
(1) DFPH first attempt candidates between 2012-2022
(2) DFPH repeat attempt candidates between 2012-2022
(3) MFPH first attempt candidates between 2012-2022

4.2. Data Processing

Data processing and analysis were undertaken in STATA SE 17.0. Data were not always systematically captured; therefore, the following definitions were used:

- **Disability:** Candidate has been coded with a disability if a disability or disability type have been declared at the time of application for the exam sitting.

- **Professional background:** Those classified as BOTM may include those with a primary medical qualification but who have applied through the BOTM route for Registrar training as they are unable to fulfil the criteria for medical applicants.

- **Exam adjustments:** Defined as those where adjustment was approved. The comparison group were those without an adjustment approved regardless of whether an adjustment was requested. This comparison group was created to assess whether adjustments were sufficient i.e., if there were significantly worse exam outcomes in those with adjustment approved vs no adjustment, which may suggest that existing reasonable adjustments are insufficient. While exam adjustments may be considered a proxy for disability, the two variables have been treated separately as not all candidates with a disability will request an examination adjustment, and not

all candidates with a disability requiring an adjustment will declare this on their application.

- **Exam timing:** The year of exam sitting was divided into four categories, including a 2017-2019 category to capture the introduction of Angoff standard setting for the DFPH exams, and a 2020-2022 category to capture the transition to online exams.

Furthermore, due to the comparatively small number of candidates from minoritised ethnic groups, ethnicity categories were aggregated upwards to create sufficiently large groups for analysis. However, Chinese ethnicity was analysed as a separate category to the Asian ethnicity category, as 85.6% of candidates of Chinese ethnicity were HKCCM candidates.

4.3. Statistical Analysis

DFPH

The main outcome for DFPH success was generated as passed both papers vs. failed one or both papers. Logistic regression was used for both univariable and multivariable analysis of DFPH exams producing odds ratios (OR) and adjusted odds ratios (AOR) [with 95% confidence intervals (CI)], assuming two-tailed testing with an alpha of 0.05. Factors that appear associated with the exam outcome in univariable analysis and had a low p value (p<0.2) were considered for inclusion in the multivariable analysis. Forwards, stepwise approach was used to build the models using likelihood ratio (LR) testing after each addition, to ascertain whether each added variable improved the fit of the model. Where the LR test gave a significant result (p< 0.05), the variable was retained in the model. Models were checked with a backwards approach. A separate analysis was conducted restricted to UK Public Health Registrars only. Sensitivity analyses were conducted with a subset of the cohort assessing the outcome: passed both papers vs failed both papers for all candidates as well as UK Public Health Registrars only.

MFPH

MFPH outcomes included pass vs fail but also MFPH unweighted average total score. Logistic regression was used for univariable and multivariable analysis for the binary outcome and models were built in a similar fashion as described above for DFPH. Linear regression was conducted for MFPH unweighted average total score.

Candidates missing demographic data are presented in the descriptive analyses with count data, but regression analyses were performed on a complete case basis to allow easier interpretation.

5. Results

5.1. DFPH First Attempt

A total 1,194 individuals attempted the DFPH for the first time between 2012 – 2022. This cohort of exam candidates were mostly female, white British and Registrars enrolled in the UK Public Health training programme. The median age at first attempting the DFPH exam was 32 years (IQR 29.8-36.6). Data were missing approximately 2% of age and sex and 17% ethnicity of candidates. Place of primary qualification was only available for 2018-2022 (30% missing data within this subset). For cohort breakdown by exam outcome, see Table A1 in the appendix. Of those with declared disability, 77 (77%) had information on disability type: mental health (n=3), physical (n=32), sensory-neural (n=40) and sensory-neural & physical (n=2). The median pass rate (passed both papers vs failed one or both papers) was 53% (IQR 42%-64%) on the first attempt between 2012-2022. For the Registrar cohort, the median pass rate was higher at 63.8% (IQR 48.9%-78.3%).

Table 1. Descriptive breakdown of cohort that sat DFPH (first attempt), 2012 - 2022 (n=1,194)

Characteristics	N	%
Sex		
Male	361	30.2
Female	812	68.0
Not known	21	1.8
Ethnicity		
White British	595	49.8
White Other	95	8.0
Asian	75	6.3
Black	54	4.5
Chinese	104	8.7
Mixed	23	1.9
Other	42	3.5
Not known	206	17.3
Disability declared		
Yes	100	8.4
No	1093	91.5
Not known	<5	0.1
Adjustment approved		
Yes	71	5.9
No adjustment, regardless of if requested or not	1123	94.1
Professional background		
Medical	573	48.0
BOTM	621	52.0
Candidate status		
UK Registrar	904	75.7
Hong Kong College of Community Medicine (HKCCM)	124	10.4
Outside of Public Health Specialty Training	166	13.9
*Place of primary qualification**		
Yes	425	35.6

No	107	9.0
Not known	876	73.4
Year of exam sitting		
2012-2013	243	20.4
2014-2016	314	26.3
2017-2019	309	25.9
2020-2022	328	27.5

*Data on place of primary qualification was only available from 2018-2022

Univariable logistic regression revealed no significant differences by sex, disability or adjustment approved for the exam outcome (passed both papers vs failed one or both papers). For every one-year increase in age at exam sitting, the odds of passing both exam papers decreases by approximately 5% (OR 0.95, 95% CI 0.92-0.97) (Fig 5A, Table A2). In the context of ethnicity, black (OR 0.05, 95% CI 0.02-0.13), Chinese (OR 0.17, 95% CI 0.1-0.28), Asian (OR 0.42, 95% CI 0.25-0.68) and white other (OR 0.53, 95% CI 0.34-0.82) candidates were less likely to pass both papers than white British candidates. There was also significantly lower odds of passing the exam for Registrar candidates from a BOTM and for UK candidates outside of public health specialty training or HKCCM candidates. The odds of passing the exam on first attempt were 3.5 times greater for those who sat the exam during 2017-2019 and 2.7 times higher for those who sat the exam during 2020-2022, compared to the 2012-2013 cohort.

Multivariable regression adjusting for sex, age, professional background, candidate status and year of exam sitting did not substantially affect the direction or significance of univariable estimates for most factors (Fig 5A). However, under the multivariable regression, the performance gap of Chinese candidates was largely attenuated with the estimate becoming insignificant, likely due to the adjustment of candidate status (HKCCM).

The analysis restricted to UK Public Health Registrars only (n=758) showed similar results identifying older candidates, black, Asian and BOTM candidates as less likely to pass (Figure 5B, Table A3).

Figure 5. DFPH exam outcome (passed both papers) on first attempt by demographics and professional background: univariable and multivariable analysis, 2012-2022

Fig 5A. All candidates (n=977)
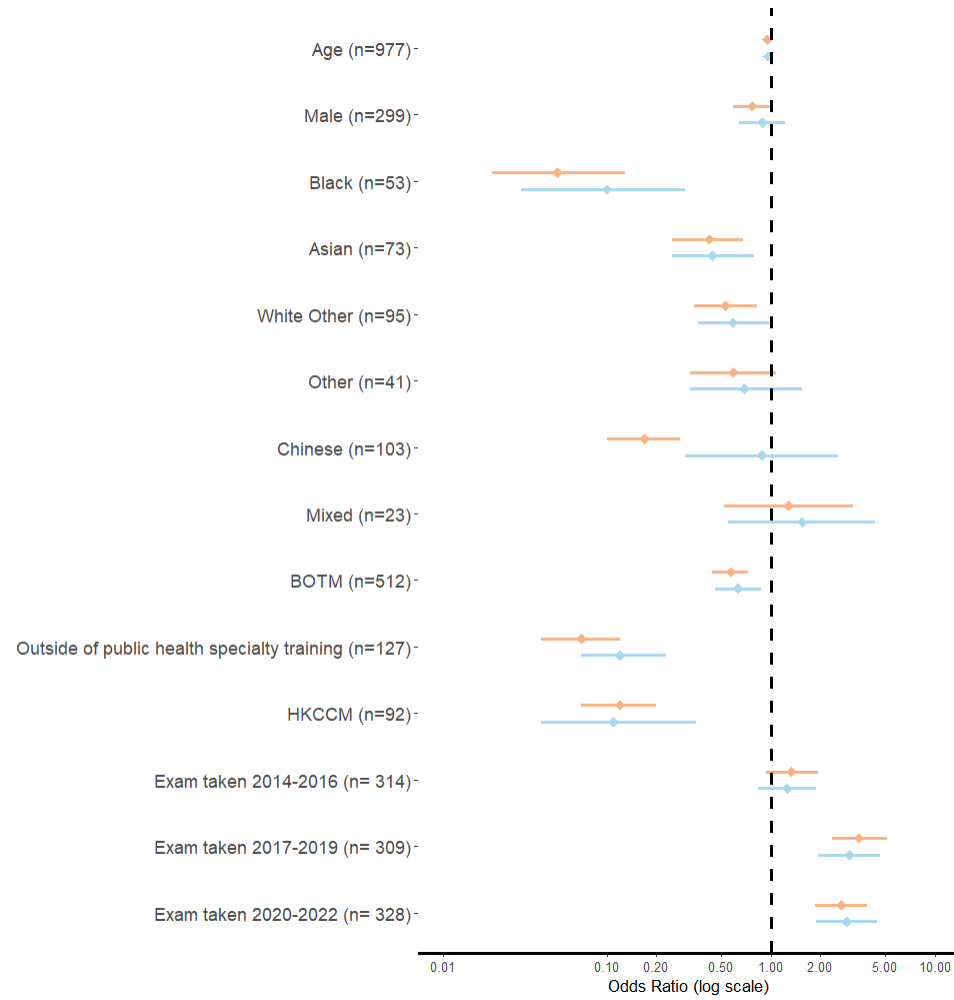
Fig 5B. UK Public Health Registrars only (n=758)
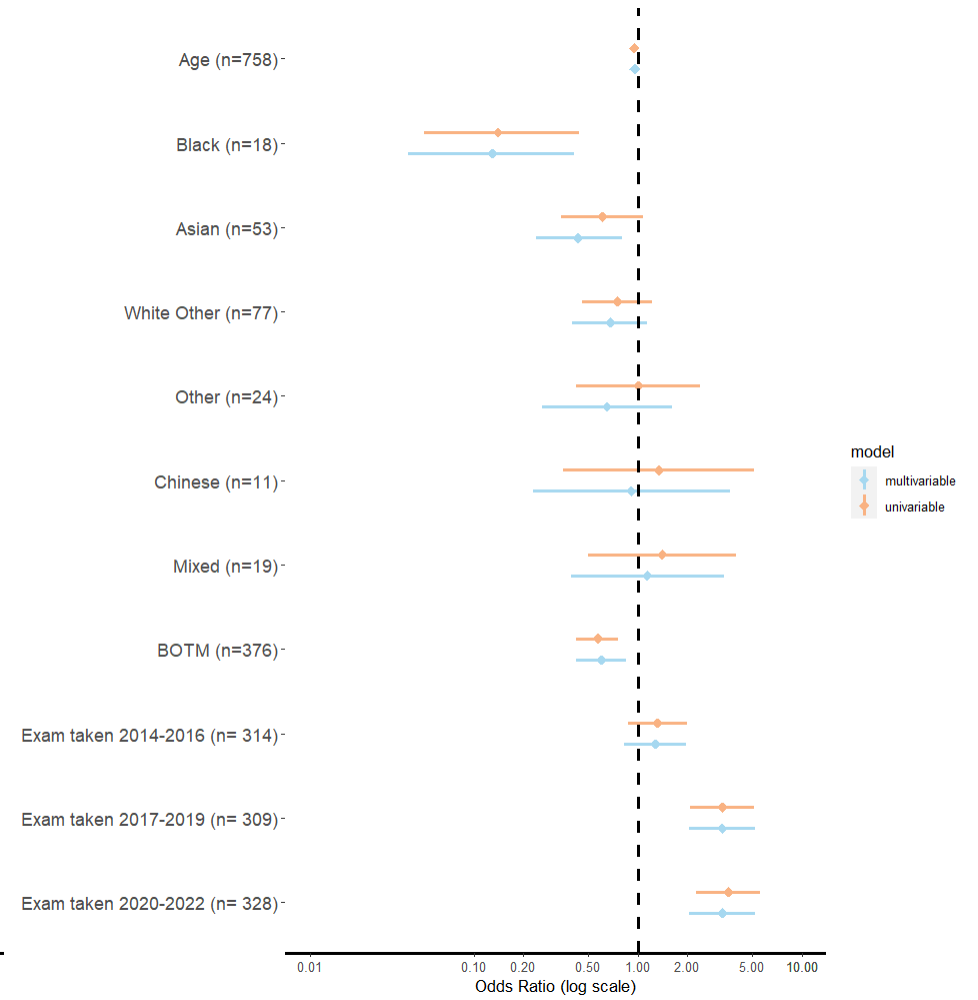
Place of Primary Qualification

With place of primary qualification only available for 2018-2022 DFPH exam sittings, a separate analysis restricted to these years was conducted (n=334). Univariable analysis showed the odds of candidates with primary qualifications outside of the UK (n=47) passing on first attempt were 87% lower (OR 0.13, 95% CI 0.07-0.27) compared to those with primary qualifications from the UK (n=287). However, following multivariable regression adjusting for age, ethnicity, professional background and candidate status, the direction of association remains, but the estimate was not significant (AOR 0.91, 95% CI 0.29-2.89).

UK Training Region

Registrars from London/Kent, Surrey, and Sussex (London/KSS) formed the largest group of DFPH candidates between 2012-2022, likely reflecting the high number of Registrar places available in the deanery. East Midlands, London/KSS and Scotland have pass rates of above 70% but there is no statistical evidence of UK training region influencing DFPH exam outcome on first attempt for the Registrar cohort (p=0.16).

Figure 6. Distribution of DFPH exam outcome on first attempt for Registrar cohort by UK training region, 2012-2022 (n=894)
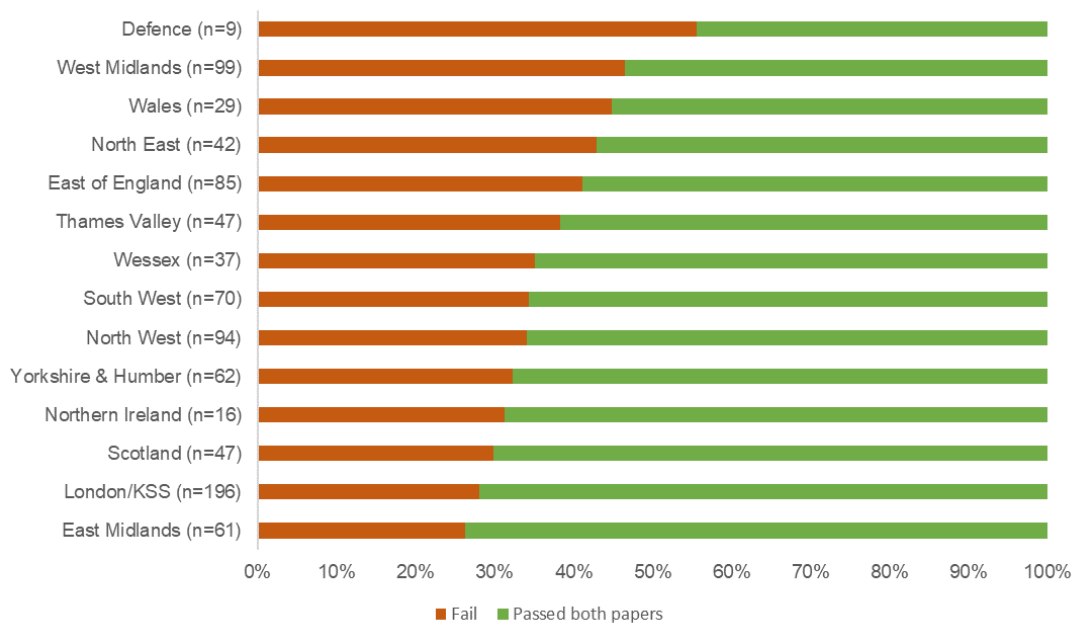
5.2. DFPH Repeat Attempts

When looking at the total number of DFPH attempts per candidate before passing the exam, median age increases with increasing number of attempts. There appears to be statistically significant differences in number of attempts for ethnicity, candidate status, and professional background (p<0.05) (Appendix Table A4). Most Hong Kong Registrar candidates are of Chinese ethnicity and are required to pass the DFPH examination as a condition of their training programme. The analysis restricted to UK Public Health Registrars shows similar results with significant differences in number of attempts for ethnicity and professional background (p<0.05). Notably only 10% of black UK Public Health Registrars in the cohort passed on first attempt, and over half required three or more attempts.

Figure 7A. Ethnicity by number of DFPH exam attempts

Figure 7A. Ethnicity by number of DFPH exam attempts for UK Public Health Registrars only

25
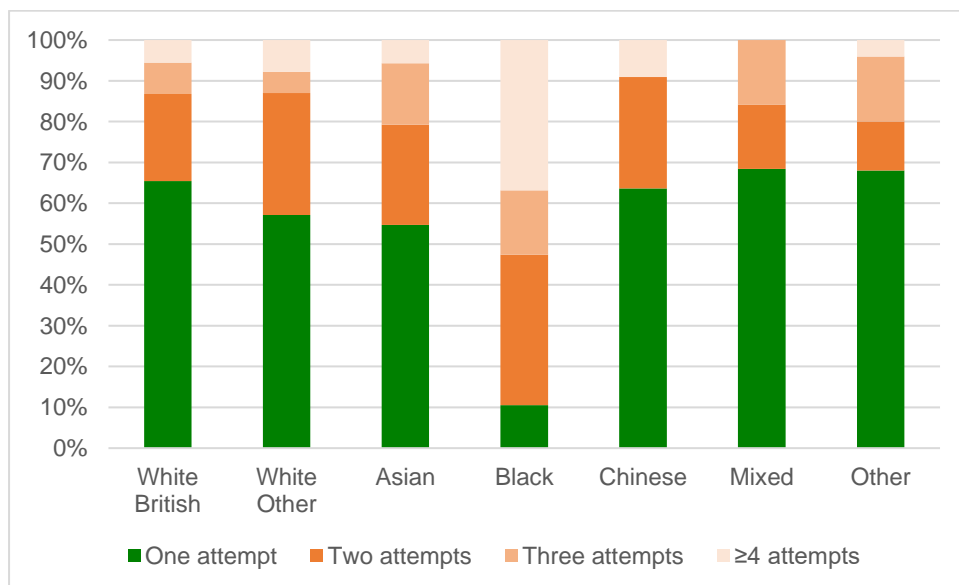
Sensitivity analysis

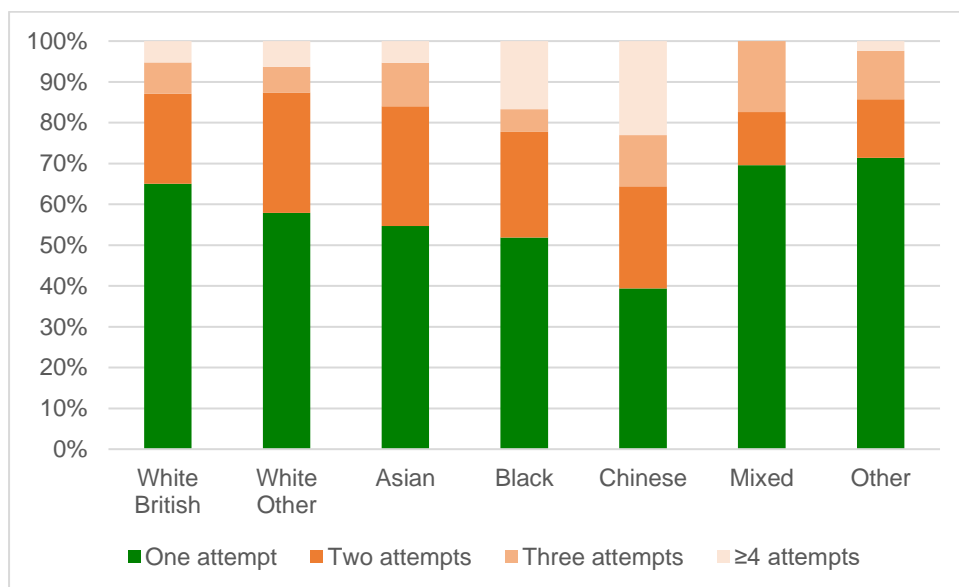DFPH exam success was also assessed by defining the outcome as passing both papers vs failing both papers on the first attempt between 2012-2022. This multivariable analysis (n=771) produced a similar model to the main analysis identifying older candidates, black and Asian and UK candidates outside of public health specialty training or HKCCM candidates as having lower odds of passing both papers on first attempt (Appendix Table A5). Although univariable analysis identified lower odds of passing the exam for white other candidates and those of BOTM, these factors became non-significant (white other p=0.06; professional background p=0.07 (dropped from final multivariable analysis)) in the multivariable model. The analysis was repeated restricted to UK Public Health Registrars only (n=569) and identified older, black candidates and those with an exam adjustment approved as having lower odds of passing both papers (Appendix Table A6).

5.3. MFPH First Attempts

A total 813 individuals attempted the MFPH for the first time between 2012 – 2022. This cohort of exam candidates were mostly female, white British and Registrars enrolled in the UK Public Health training programme. The median age at first attempting the MFPH exam was 34 years (IQR 31.1-37.9). Data were missing approximately 1.5% of age and sex and 16% ethnicity of candidates. Of those with declared disability, 26 (90%) had information on disability type: mental health (n=4), physical (n=2), sensory-neural (n=17), sensory-neural & mental health (n=1) and sensory-neural & physical (n=2). The median pass rate was 90% (IQR 82%-97%) on the first attempt between 2012-2022. Separate analysis restricted to UK Public Health Registrars only was not conducted for the MFPH as UK Registrars comprised 96.2% of the MFPH cohort.

Table 4. Descriptive breakdown of cohort that sat MFPH (first attempt), 2012 - 2022 (n=813)

Characteristics	N	%
Sex		
Male	230	28.3
Female	571	70.2
Not known	12	1.5
Ethnicity		
White British	496	61.0
White Other	69	8.5
Asian	45	5.5
Black	19	2.3
Chinese	13	1.6
Mixed	12	1.5
Other	31	3.8
Not known	128	15.7
Disability		
Yes	29	3.6
No	784	96.4
Adjustment approved		
Yes	26	3.2
No adjustment regardless of requested or not	787	96.8
Professional background		
Medical	400	49.2
BOTM	413	50.8
Candidate status		
UK Registrar	782	96.2

Hong Kong College of Community Medicine (HKCCM)	<5	0.5
Outside of Public Health Specialty training	27	3.3
Year of exam sitting		
2012-2013	152	18.7
2014-2016	159	19.6
2017-2019	276	34.0
2020-2022	226	27.8

Exam outcome defined as Pass vs Fail (2012-2022)

Univariable logistic regression revealed no significant differences by sex, disability, adjustment approved for the exam outcome or professional background. For every one-year increase in age at exam sitting, the odds of passing the MFPH decreases by approximately 7% (OR 0.93, 95% CI 0.90-0.97). The odds of passing on first attempt were 91% lower for Black candidates (OR 0.09, 95% CI 0.04-0.24) compared to white British candidates. There was also significantly lower odds of passing the exam for candidates outside of public health specialty training (excluding HKCCM) compared to candidates on the training scheme. Furthermore, individuals who took the MFPH exam between 2020 and 2022 had higher odds of passing compared to those who took the exam between 2012 and 2013 (OR 3.4, 95% CI 1.61-7.13). In multivariable regression analysis, increasing age, as well as black and Asian ethnicity, were the only characteristics associated with lower odds of passing the MFPH exam (Appendix Table A7).

Figure 8. MFPH exam outcome (pass vs fail) on first attempt by demographics and professional background: multivariable analysis, 2012-2022 (n=675)
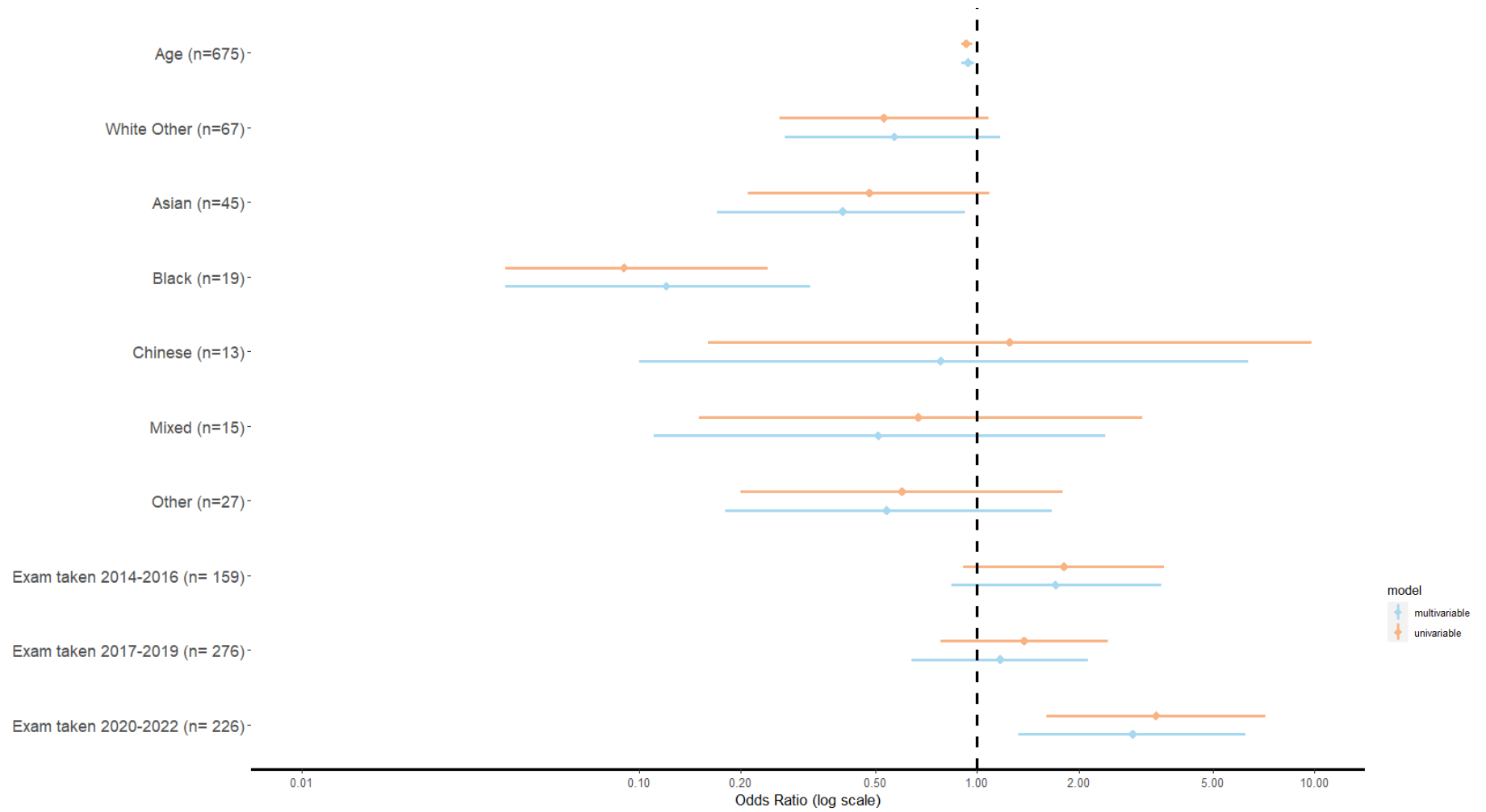
UK Training Region

Registrars from London/Kent Surrey and Sussex (London/KSS) form the largest group of MFPH candidates between 2012-2022, likely reflecting the high number of Registrar places available in the deanery. London/KSS, Wales and South West have pass rates of above 93% but there is no statistical evidence of UK training region influencing MFPH exam outcome on first attempt for the UK Registrar cohort (p=0.58). 3/782 candidates that were recorded as Registrars were missing training region information.

Figure 9. Distribution of MFPH exam outcome on first attempt for Registrar cohort by UK training region, 2012-2022 (n=779)
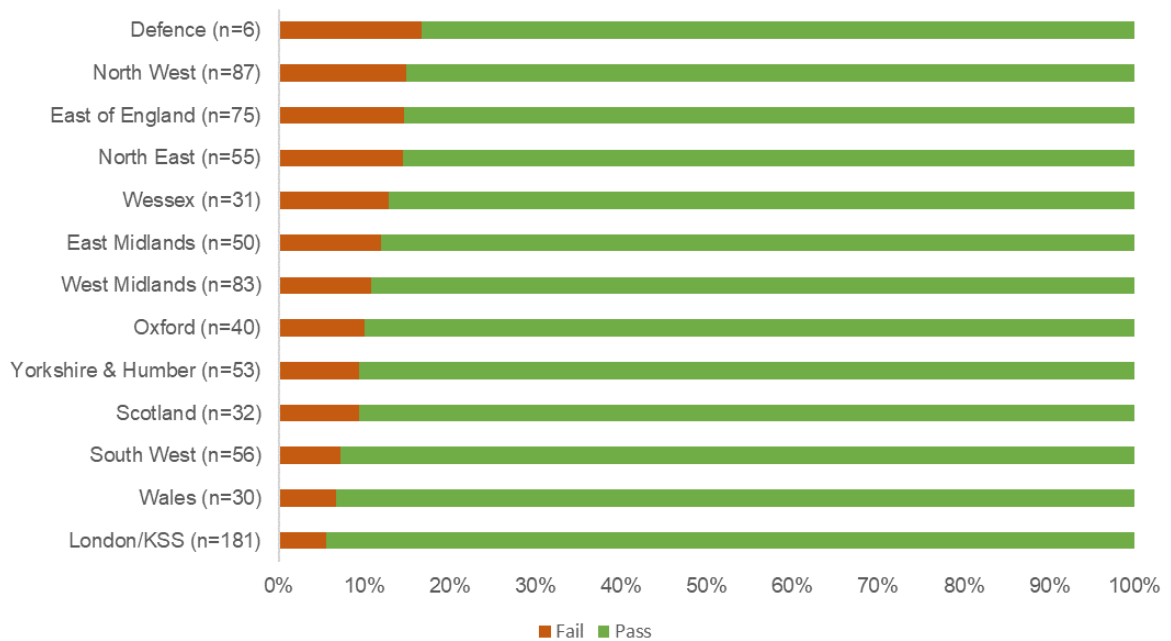
6. Discussion

This is the first study to explore differential attainment in passing the FPH membership examinations. The analysis reveals unexplained variation in the outcomes of passing both the DFPH and MFPH exams at first attempt, suggesting likely differential attainment. For the DFPH exam, after multivariable analysis, there is evidence of differential attainment by four demographic groups, summarised in Table 5. The same four groups (age, ethnicity, candidate status and professional background) are also statistically significantly associated with differential attainment in the outcome of total number of attempts before passing the DFPH exam. In multivariable regression, increasing age and being of black or Asian ethnicity were the only characteristics associated with lower probability of passing the MFPH. Notably the characteristics of increasing age, black and Asian ethnicity and professional BOTM were also associated with lower likelihood of success in the recruitment into public health specialty training. This analysis therefore suggests that the demographic groups affected by differential attainment at the recruitment stage of the specialty training pathway, are also affected by differential attainment in the examinations.

Table 5. Summary of differential attainment by characteristics across the DFPH and MFPH. The table summarises the odds of passing the exam for each demographic variable compared to the reference group.

Characteristic	Evidence of DA in DFPH	Evidence of DA in MFPH
Sex	**No.** Males and females are equally likely to pass both papers. (no statistically significant difference)	**No.** Males and females are equally likely to pass. (no statistically significant difference)
Age	**Yes.** Odds of passing both papers varies by age, even after adjusting for ethnicity, sex, professional background, candidate status and year of exam sitting. The odds of passing both papers decreases by 5% for every 1-year increase in age.	**Yes.** Odds of passing varies by age after adjusting for ethnicity. The odds of passing both papers decreases by 6% for every 1-year increase in age.
Ethnicity (ref: white British)	**Yes.** Odds of passing both papers varies by ethnicity even after adjusting for age, sex, professional background, candidate status and year of exam sitting. For every 100 candidates of White British ethnicity who pass the DFPH on first attempt: 10 candidates of black ethnicity pass on first attempt 44 candidates of Asian ethnicity pass on first attempt	**Yes.** Odds of passing varies by ethnicity after adjusting for age. For every 100 candidates of White British ethnicity who pass the MFPH on first attempt: 12 candidates of black ethnicity pass on first attempt 40 candidates of Asian ethnicity pass on first attempt

	• 59 candidates of white other ethnicity pass on first attempt	
Professional background (ref: Medical background)	**Yes.** Odds of passing both papers varies by professional background even after adjusting for age, sex, ethnicity, candidate status and year of exam sitting. For every 100 candidates from a medical professional background who pass the DFPH on first attempt: • 63 candidates from a professional BOTM pass on first attempt	**No.** No statistically significant difference in pass rate based on professional background.
Candidate status (ref: PH Registrar training scheme)	**Yes.** Odds of passing both papers varies even after adjusting for age, sex, ethnicity, professional background and year of exam sitting. For every 100 candidates who are UK Public Health Registrars who pass the DFPH on first attempt: • 11 candidates from the HKCCM pass on first attempt • 12 candidates outside of PH specialty training pass on first attempt	**Yes.** Odds of passing varies by candidate status. In univariable analysis, for every 100 candidates who are UK PH Registrars who pass the MFPH on first attempt: • 35 candidates outside of PH specialty training (excluding HKCCM) pass on first attempt. However, after adjusting for ethnicity and age, this is no longer significant.
Disability	**No.** No statistically significant difference in pass rate based on declared disability.	**No.** No statistically significant difference in pass rate based on declared disability.
Adjustment approved	**No.** No statistically significant difference in pass rate based on having a reasonable adjustment approved for the exam sitting.	**No.** No statistically significant difference in pass rate based on having a reasonable adjustment approved for the exam sitting.
Place of primary qualification* (ref: primary qualification in UK)	**Yes.** Odds of passing both papers varies by place of primary qualification. In univariable analysis, for every 100 candidates who obtained their primary qualification in the UK who pass the DFPH on first attempt: • 13 candidates who obtained their primary qualification	N/A

| | outside the UK pass on first attempt.

However, after adjusting for age, ethnicity, professional background and candidate status, the estimate is not significant. | |
|---|---|---|
| *data on this variable were only available for 2018-2022 candidates | | |
| **UK Training region** | **No.** No statistical difference for UK training region influencing pass rate. | **No.** No statistical difference for UK training region influencing pass rate. |

Differential attainment by candidate status is arguably an expected outcome, as Public Health Registrars are likely to have greater access to social and professional networks, educational support, and formal revision programmes compared to other candidates outside of the UK speciality training programme. Nevertheless, candidates undertaking the UKPHR portfolio route to specialist registration may be encouraged to sit the DFPH exam to demonstrate "know how" competencies. If so, consideration of how to provide more systematic support to these candidates may be warranted. The analysis also reveals significantly lower odds of passing the DFPH for Hong Kong Registrar candidates. The odds of passing the DFPH are significantly lower for candidates of Chinese ethnicity in univariable analysis, however under the multivariable regression, the performance gap was largely attenuated with the estimate becoming insignificant, likely due to the adjustment of candidate status. Further discussion with the HKCCM is warranted to highlight the attainment gap and inform decision-making around how best to support Hong Kong Registrars sitting the DFPH examination.

This study identified declining DFPH and MFPH first attempt pass rates with increasing age. Similar evidence of differential attainment by age has been observed in the published literature including in relation to undergraduate degree outcomes[17] and other postgraduate medical examinations, such as the Membership of the Royal College of Surgeons (MRCS) exams[42]. Declining success with increasing age was also observed in recruitment into UK public health specialty training[14] and in progression through UK specialty training programmes[43]. The causes of differential attainment by age are not well established. Posited explanations include greater time, financial and caring responsibilities outside of the training programme and possible challenges engaging in informal social support groups with other trainees, either due to personal circumstances or the age gap[43]. Older candidates may also have had a longer gap between their last exam experience and sitting the DFPH, which may affect their familiarity with revision tools and exam technique.

The findings from this study suggest significant differential attainment in DFPH and MFPH pass rates by ethnicity, in common with the wider literature on differential attainment[1, 19, 20, 22, 25, 42]. The greatest difference in outcomes was observed for black candidates in both exams, followed by Asian candidates in both exams and white other candidates in the DFPH only. The aggregation of data into larger ethnicity categories to enable meaningful analysis may have masked significant differences in outcomes by more precise ethnic categories. As explored earlier in the report, the causes of differential attainment by ethnicity are multifactorial and are likely to be a consequence of systematic and structural inequities in the distribution of privilege and power within the learning and workplace environment[2]. The "Fairer Training for All" report identified some key risk factors for poorer outcomes for doctors from minoritised ethnic groups. These included poorer relationships with seniors which could affect learning opportunities and confidence, and a fear of being labelled as problematic if workplace problems were raised[6]. The detrimental impacts of lower scores in

recruitment and exams were also highlighted, such as reduced autonomy in job choice, a greater risk of being separated from family and friends, interrupted opportunities for workplace learning, and a greater risk of mental ill health[6].

The identified differential attainment by professional background is unique to public health as a medical specialty with candidates from a professional BOTM sitting its exams. As such, there is little existing literature to understand the potential causes of this differential attainment. Furthermore, the categorisation of professional BOTM is problematic in itself, amalgamating a heterogeneous group of people with diverse educational and professional experiences into one group. Further qualitative research is needed to begin to understand the exam experiences of candidates from a professional BOTM and potential causes of the observed differential attainment.

This study did not identify differential attainment in public health postgraduate exams by self-reported disability status. However, these results may be affected by the accuracy of disability and reasonable adjustment recording practices over the ten-year period. Furthermore, surveys of doctors with disabilities have identified significant concerns around disclosing disability or long-term health conditions[44], with IMG doctors from Asian and black ethnic groups the least likely to report disability[25]. Some candidates may not have had a diagnosis of their disability or neurodiversity on their first examination attempt, given examination failures can be a trigger for assessment. As a result, disability is likely to have been underreported in our cohort for analysis.

In the wider literature, studies examining the association between disability and postgraduate medical examination outcomes have found conflicting results, with no evidence of differential attainment for dyslexic candidates in the written Applied Knowledge Test of the Membership of the Royal College of General Practitioners (MRCGP)[45] or the Intercollegiate Membership of the Royal College of Surgeons examination (MRCS)[46]. However, doctors with dyslexia were found to have lower pass rates in MRCGP clinical examination[47], and doctors with a declared disability on average had a 4% lower specialty exam pass rate than doctors with no declared disability in GMC analysis of pass rates across all UK medical specialty exams[25]. Doctors with disabilities have reported experiences of discrimination within the workplace[44, 48], and reduced access to support and reasonable adjustments after university[49]. A 2020 report from the British Medical Association (BMA) identified a widespread perception that medicine does not have a disability inclusive culture, with poor recognition of the realities of living and working with a disability[44]. Therefore, we suggest there remains a need to understand the experience of candidates with disabilities who sit the public health postgraduate exams and consider how systematic inequalities may affect their exam outcomes.

This study also did not identify statistically significant differential attainment by place of primary qualification after multivariable regression. However, the analysis was limited by a relatively small sample size as place of primary qualification was only available for candidates sitting public health postgraduate exams between 2018-2022 with 30% missing data within this subset. Furthermore, there have historically been very few IMGs in public health speciality training. The high recruitment competition ratios and addition of applicants from a professional BOTM has meant international applicants have not been sought out. Applicants to public health specialty training from IMG backgrounds are also underrepresented in appointment to the programme[14]. Within the wider literature there is persistent evidence of lower medical specialty exam pass rates for doctors who qualified outside of the UK[19, 25]. Risk factors identified for IMG doctors in the "Fair Training Pathways

for All" report included inexperience with UK assessments and work systems, cultural differences which could affect relationships with peers and trainer confidence in IMG's prior training, the stigma of asking for help, and practical challenges such as dealing with visa difficulties and costs[6].

There were no significant differences in pass rates for the DFPH or MFPH by sex or UK training regions. Individual level exam outcome data has only been documented within the FPH records as a binary pass/fail outcome for each DFPH paper over the past ten years of data. This has precluded any further analysis of differential attainment by sections of the syllabus or question type in this report.

6.1. Limitations

Despite being the most extensive analysis to date, there are inherent limitations in the study design. Large datasets in cohort studies are constrained by the data available. Notably, the absence of 17% ethnicity data and broad categorisation of ethnic groups limits comprehensive examination of diversity and intersectionality of identities and experiences. The absence of candidate socioeconomic status data also means this could not be explored as a potential variable associated with differential attainment in public health postgraduate exams and may contribute to residual confounding.

A further potential source of residual confounding is the impact of COVID on candidate's training and learning experiences, and the assessment environment and modality. This will have particularly affected candidates sitting the DFPH exam from 2020 onwards, and the MFPH between November 2020 to April 2022 when the assessments moved to an online format. There may also have been incremental changes in the style of DFPH question over the ten-year period, however we have tried to address this by categorising the time of exam sitting into four categories, including a 2017-2019 category to capture the introduction of Angoff standard setting, and a 2020-2022 category to capture the transition to online exams. Finally, the heterogeneity of candidates' professional backgrounds, particularly those with a professional BOTM, creates difficulty in measuring and categorising prior educational experience.

Due to small numbers, place of primary qualification necessitated broad categorisation (UK vs. non-UK), preventing a more nuanced analysis across Europe and other regions. The temporal span of the dataset used also introduces challenges due to changes in recording practices of candidate characteristics. Specifically, the accuracy of disability and reasonable adjustment data may be compromised by suboptimal recording practices, and the dynamic nature of approval criteria over time introduces uncertainty. Additionally, there may be a risk of misclassification, particularly regarding potential overlaps among professional group exposures, such as medical Registrars enrolled in training through the BOTM route. However, this number is likely to be small.

GMC analysis of postgraduate exam outcomes across UK medical specialties identified differential attainment by religion[25]. Specialty exam pass rates were slightly higher for doctors who identify as gay or lesbian for both women and men, but this pattern was not consistent across ethnic groups[25]. Data has not been systematically collected on candidate religion or sexual orientation for FPH examinations which precluded analysis of these variables in this study.

7. How can differential attainment in examination outcomes be addressed?

Existing evidence around which specific interventions make a meaningful and sustainable difference to addressing differential attainment in examinations is limited[25, 29]. The following principles and interventions are drawn from undergraduate and postgraduate medical education settings, often with a focus on addressing differential attainment by ethnicity or place of primary medical qualification. As such, the generalisability of these interventions to the context of postgraduate public health examinations should be considered, particularly in relation to the differential attainment experienced by candidates from a professional BOTM. Engagement with all stakeholders involved in the public health postgraduate examinations, and particularly those groups affected by differential attainment, will be essential in co-producing appropriate interventions.

A GMC funded study titled "What supported your success in training?" examined training programmes with no evidence of differential attainment in trainee outcomes[50], building on the protective processes identified in the "Fair Training Pathways for All" report[6]. The report identified ten success factors related to three main areas; workplace and learning environment characteristics, the people who support learning across multiple roles, and strategies which support learning[50]. These are summarised in Figure 10. The report suggests that increasing the accessibility of these success factors will enable training programmes to meaningfully reduce differential attainment[50].

Figure 10: A summary of the 10 Success Factors identified in the "What supported your success in training?" report[50]

Working & learning environment

SF1: An inclusive workplace that values diversity – *a working environment where diversity in all senses (background, culture, experience) is visible and valued*

SF2: Treating learners as individuals – *Recognition that an individual's background and experiences in and outside of work will meaningfully impact progression through training, providing support where necessary*

Learning pathway

Medical School   Foundation   Core/Higher Specialty

Who supports learning

SF3: Working with inspirational senior colleagues – *access to senior colleagues who act as informal role-models, mentors or career coaches to help learners access opportunities and develop themselves*

SF4: The supportive trainer or supervisor – *Trainers and supervisors who encourage and support learners in the workplace with their development*

SF5: Having the support and validation of peers – *Accessing a network of peers who can improve learning, make sense of experiences and provide advice and guidance on the practicalities of training*

What supports learning

SF7: Maximising the value of learning – *ensuring learning at work and in training is valuable, holistic and helps inform career choices*

SF10: Personal motivation & drive – *Drawing on personal commitment, drive and motivation to succeed in training*

SF8: Gaining clarity, certainty and support for career choices – *accessing experiences, knowledge and learning and development opportunities that support informed decisions about career choices or next steps*

SF6: Working arrangements that facilitate learning – *shifts, rotas and work structures that support learners to build meaningful relationships with team members and dedicate time to learning*

SF9: Support to pass exams or deal with exam failure – *being prepared and supported to navigate the process of completing challenging professional exams*

7.1. Proactive Leadership

A crucial first step to addressing different attainment is recognising it as a structural problem, rather than as a consequence of perceived individual learner deficit[2]. Addressing differential attainment therefore becomes everyone's responsibility, prompting reflection around aspects of curricula, assessment design, learning and workplace environments and policies which may contribute to discrimination and differential attainment. Initiatives should be developed collaboratively and inclusively with affected stakeholders, without stigmatising certain demographic groups. Differential attainment is not exclusive to public health postgraduate examinations[1, 2]. Collaboration with relevant postgraduate training bodies will facilitate the sharing of good practice both within and outside of the specialty of public health[51].

Organisations can adopt and commit to delivering antidiscrimination policies, ensuring support is readily available to staff if they experience discrimination or prejudice in the workplace, and to making culturally competent decisions in recruitment and progression practices[1]. Engaging in diversity and inclusivity initiatives can disproportionately fall on colleagues from underrepresented and minoritised backgrounds[52]. The often unrecognised burden of this work has been described as a "minority tax", with implications for individuals' physical and mental well-being, and their capacity to engage in other workplace opportunities which are better recognised and rewarded[52-55]. Organisations should ensure staff receive the necessary dedicated time, resources, and recognition to carry out this important antidiscrimination work[56, 57]. Individuals may also wish to consider how they can mitigate the "minority tax" on colleagues from minoritised backgrounds. This might include understanding different forms of discrimination and how to challenge these in the workplace[52, 54], proactively providing mentoring to minoritised students and colleagues[50], or engaging in critical reflection on our own cultural assumptions[58].

7.2. Inclusive and Fair Assessments

While the causes of differential attainment are increasingly recognised as multifactorial and systemic throughout the learning and workplace environment, clearly it remains essential to ensure assessments themselves are fair. Fair assessments have been defined as "those which offer learners similar or equitable opportunity to demonstrate their knowledge, understanding and competence with minimal impact from external factors, such as gender, race or ethnicity"[2]. In other words, differential knowledge and skills should be the only significant outcome discriminators in a fair assessment.

Inclusive Curricula

Research from UK higher education settings suggests a need to acknowledge that curricula tend to be designed and constructed in line with the historical, social, and cultural backgrounds of academics, which may differ to those of students undertaking the assessments[5]. An inclusive curriculum recognises that students have multiple identities, shaped by their diverse backgrounds and experiences[2]. Student diversity is understood to be a key strength, providing learning opportunities for students and faculty. An inclusive curriculum seeks to ensure that the curricula is accessible and acceptable for all students. Faculty and students with diverse backgrounds and experiences are invited to collaboratively develop and evaluate the curriculum and associated assessments. This approach is suggested to better reflect the diversity of students and wider society, promote cultural competence, identify unintended barriers for protected or minoritised groups, and avoid stereotyping or cultural bias[59].

Assessment Familiarity

A further factor suggested to contribute to differential attainment is familiarity with the examination method. Some candidates, particularly those from minoritised groups, are likely to have less prior experience with particular assessment methods[60], impacting on their performance in the assessment[61, 62]. As such, the Academy of Medical Royal Colleges (AOMRC) advises that inclusive universal support should be available for all candidates in advance of an exam attempt[51]. Figure 11 outlines what this universal support may include. Increasing the availability of formative assessments may also help to improve both candidates' familiarity with a given assessment format, and their sense of agency within the assessment system and learning process, helping to address any differences in prior assessment experiences[2]. The provision of specific and actionable formative feedback from these formative assessments prior to sitting the high-stakes summative examination is an additional strategy to achieve equity in postgraduate medical assessments[60].

Figure 11: AOMRC Guidance on what may be included in universally accessible published examination support for candidates in advance of an examination sitting to address the differential attainment gap[51]

1. Guidance on exam technique and marking schemes

2. Explanation of standard setting and how to score marks

3. Familiarisation with the test environment and structure

4. Exemplar materials such as sample papers or videos of candidates taking stations, both doing well and making errors

5. Sign posting to exam reports, which may contain standard setting, information on different cohorts and subject domains

6. Videos or interviews with examiners or senior trainees providing tips and advice on what to expect on the day

7. Webinars with examiners with an opportunity for Q&A

8. Provision of information on the performance of different cohorts

9. Orientation with exam formats, particularly online assessment platforms

10. Information on applying for reasonable adjustments and the notification period required.

Assessment Methodology

It is beyond the scope of this report to conduct a detailed literature review exploring differential attainment by assessment design, tool, or modality. Numerous elements of assessment including the assessment design, question-writing, blueprinting, peer review and scoring (among others) may each unintentionally introduce construct-irrelevant factors which may present barriers to some groups of candidates[2, 63-65]. The exam content, design, and the epistemological assumptions underlying these factors should be routinely analysed to identify and address any such barriers[2, 51]. There are examples of statistical approaches which can be used to routinely analyse assessment data to identify differential attainment at the question level. Differential Item Functioning can be used to examine if individual questions explain group-level differences in performance, offering an opportunity to revise or remove these questions[66, 67]. Many Faceted Rasch Modelling may also be used to identify

sources of error (examiner, domain and station) which may influence the student outcome[68]. AOMRC guidance advises that exam design should be regularly evaluated to remove any disadvantages to specific cohorts, including language and scenarios which may introduce unnecessary cultural bias, alongside the use of differential item functioning[51].

Finally, the persistent evidence of differential attainment across single-moment-in-time high-stakes postgraduate medical examinations (such as the DFPH and MFPH) has led to some calls to entirely re-evaluate the role of this assessment method in specialty training[69]. While other assessment methods will also clearly have their own weaknesses, it is suggested that the disproportionate punitive effect of high-stakes examination failure due to underlying systemic issues should not be overlooked. Examination failures have been associated with reduced autonomy in job choice, interrupted opportunities for workplace learning, and a greater risk of mental ill health[6]. Broad sampling using multiple assessment types on multiple occasions with different examiners, as seen in programmatic assessment, is one suggested alternative approach[2].

7.3. Inclusive and Fair Working and Learning Environments

Working and learning in a diverse and inclusive workplace has been identified as a key success factor, facilitating progression through postgraduate training[2, 50]. Diversity may relate to numerous characteristics including ethnicity, gender, age, place of training, working style, personality, and cultural background[50]. The presence of visible diverse leaders as role models in national, regional, and local organisations has been identified as a protective factor against differential attainment, providing reassurance of an inclusive culture and reducing feelings of isolation[59]. Diverse faculty may help to bring diverse perspectives to curricula and assessment, helping to create more equitable and inclusive structures and processes[2]. Furthermore, being part of both formal and informal social networks with peers, faculty, and wider colleagues can help to build social capital[50, 70] and a sense of belonging[71], mitigating the impact of systematic discrimination in the workplace and learning environment[2]. The importance of spending time with peers has particularly been highlighted as a success factor in addressing differential attainment in postgraduate settings. Peer networks offer mutual support and near-peer mentoring, as well as validation, benchmarking and networking opportunities[50].

Educational Supervisors

Good relationships with Educational Supervisors have been identified as a key protective factor in addressing differential attainment, helping with navigating training, accessing educational resources and overcoming negative experiences such as examination failure[6, 72]. Educational Supervisors, supported by Training Programme Directors (TPDs) and Heads of Schools, have a key role to play in understanding and valuing the personal experiences, strengths, and circumstances for each Registrar. However, the 2022 GMC National Training Survey identified low levels of confidence among Educational Supervisors in having the necessary resources to support trainees of all backgrounds, beliefs, and identities[73]. Interventions to raise awareness around differential attainment, it's impacts, and how to support trainees therefore offer another potential intervention. For example, a series of workshops seeking to support "Compassionate, Courageous, Cross-Cultural Conversations" were delivered to Educational and Clinical Supervisors working in Psychiatry[72]. The workshops aimed to raise awareness of the barriers and protective factors which impact on

trainee progression and particularly the outcomes of marginalised learners. Independent evaluation suggests that in addition to increasing awareness of differential attainment and motivation for further reflection among supervisors, the workshop also led to proactive changes to their supervision in the following months. These included a more proactive approach to addressing the topic of differential attainment with trainees, the development of improved support mechanisms, and a heightened awareness of the individual needs of different trainees[72].

7.4. Targeted Mentoring and Sponsorship

Differential Attainment Champions

An alternative approach taken by the North West School of General Practice involved supporting experienced GP educators to act as Differential Attainment Champions (DAC)[74]. The DACs provided one-to-one sessions to support Registrars at risk of differential attainment, with some also using group work sessions. An initial evaluation exploring the impact of the first group of DACs was carried out by Edge Hill University. The DAC role was felt to be useful in providing proactive, tailored, and targeted support that addressed the unique needs of individual Registrars from early on in the training programme. Further useful features of the DAC role included the freedom to support Registrars across a wide range of training needs, including e-portfolio and ARCP advice, examination advice, communication skills and personal help (such as settling into a new region). The evaluation reported improved examination outcomes and portfolio engagement for Registrars participating in the DAC sessions. While the flexibility of the DAC role was seen as a strength of the intervention, this did raise challenges in quantifying the number of Registrars who could be supported by one DAC and in managing the DACs workload. It is suggested that the positive supervisory relationships and targeted early support offer a useful model to other specialties in building a diverse workforce[75].

7.5. Targeted Assessment Support and Feedback

Feedback after Exam Failure

The AOMRC has outlined minimum standards for candidate feedback following a summative examination attempt[76]. In addition to these minimum standards, additional feedback principles are outlined to address the attainment gap[51]. These include providing personalised feedback, with verbal descriptors where possible, on areas of strength and weakness against the expected standard, alongside domain performance and relative performance compared to other candidates[51]. It is suggested that more detailed feedback than the minimum standard should be offered to candidates with additional educational needs, or who are from known disadvantaged groups[51]. Furthermore, the AOMRC advises that candidates should be supported to reflect on this feedback in detail through discussion with a Clinical/Educational Supervisor, examiner, mentor, or senior trainee[51].

An example of such an approach is the educational programme delivered to GP Registrars resitting the Clinical Skills Assessment (CSA) in the North West of England in 2016-2017[77]. The intervention provided educational resources to help Educational Supervisors to assess a Registrar's readiness to sit the CSA. A toolkit could then be used to provide suggested educational strategies to address individual problem areas, and Registrars could access a case bank of practice cases. Each Registrar sat a three-case mock examination, using

experienced role players, which was video recorded. The Registrar, their Educational Supervisor and a specially trained GP educator then used this recording of the mock examination alongside information from the Registrar's portfolio to refine the Registrar's learning needs analysis, and to develop a written educational plan ahead of their next exam attempt. Registrars evaluated the intervention positively. They recognised the resource investment into providing detailed insight into their exam failure and reported feeling valued and supported as trainees. The pass rates for Registrars who participated in the programme exceeded national pass rates. The specially trained GP educators had received specific training from CSA examiners and were therefore perceived to be highly credible by both Registrars and Educational Supervisors.

Targeted Support in Preparing for Exams

Support may also be offered proactively to candidates identified to be at higher risk of failing an examination. The AOMRC advises that criteria for offering enhanced, targeted support to a group of candidates should be clearly documented in a policy, and where possible, based on evidence of individual educational needs identified through formative workplace assessments[50, 51]. However, the report also recognises that targeting support to certain cohorts, for example based on GMC data, could help organisations to comply with their duty to advance equality of opportunity between individuals with and without protected characteristics[51]. There is potential for conflict between reliably and robustly assessing the performance of all candidates, while also offering targeted support to some groups or individuals. The AOMRC advises creating bespoke stations and questions for use in targeted support interventions, which are reflective of the real examination but not included in any live question banks[51]. Exam boards may also wish to consider commissioning experienced examiners within external training or events departments to deliver the targeted interventions separately to the exam board, or providing materials and courses which can be delivered by deaneries[51].

An example of a targeted approach includes the eight two-day masterclasses delivered by the Royal College of Psychiatrists between July 2021 and Nov 2022[72]. These sessions delivered targeted support to junior doctors from groups identified to be at statistically higher risk of failing to pass the Clinical Assessment of Skills and Competencies (CASC) examination. The CASC is an assessment of clinical skills delivered in a similar format to an Objective Structured Clinical Examination (OSCE). The masterclass sessions focused on raising awareness of key components of the exam and developing and applying skills related to examination preparation and performance. Attendees were provided with opportunities to practice and receive specific feedback on their technique. Early evaluation findings suggest both UK and IMG doctors from minoritised ethnic groups who attended the training had higher pass rates than those who did not, and the attainment gap was narrowed for masterclass participants[72]. Attendees reported that the masterclass improved their understanding of the examination and its requirements, with most learning focused around "generalisable examination skills" rather than CASC specific skills[72]. The masterclasses were facilitated by current examiners in a safe learning environment, which attendees perceived to provide more focused and relevant feedback, improving their own self-belief.

8. Recommendations

	Recommendation	Relevant Stakeholder(s)
1.	**Leadership** Building an inclusive workplace, and recognising differential attainment as a structural problem, requires organisational and individual leadership across workplace and learning environments.	
1.1	The FPH should review the terminology used across the Fair Training programme of work and ensure that language which recognises responsibility lies with institutions and organisations to initiate systematic and structural change is consistently used.	• FPH Education Committee • FPH EDI Committee/SIG
1.2	A "Fair Exams" task and finish group will be established to engage more widely on the recommendations from this report, prioritise and oversee the implementation of co-produced interventions, and to facilitate collaboration between stakeholders both within and outside of the public health context. This will include considering how best to support candidates sitting the examinations outside of the specialty training programme, including international candidates through work being explored by the Global Health Committee.	• FPH Education Committee
1.3	The findings of this report should be shared with the HKCCM to highlight the attainment gap for Hong Kong Registrars and inform decision-making around how best to support Hong Kong Registrars sitting the DFPH examination.	• FPH Education Committee
1.4	Guidance around what it means to build an inclusive workplace and learning environment should be developed and shared with training regions and supervisors. This could include the hosting of a learning event to facilitate the sharing of good practice, and to enable discussion and collaboration around any challenging areas within the public health context.	• FPH EDI Committee/SIG
1.5	Organisations and leaders should commit to appropriately resourcing the necessary work to address differential attainment, and to recognising the work of colleagues in this space.	• All relevant stakeholders
1.6	The FPH should commit to examining for differential attainment and experiences throughout the public health specialty training programme through	• FPH

		measures of progress such as ARCP outcomes, CCT outcomes, and measures of training quality.	
2.		**Improve data collection to better understand and monitor differential attainment in public health postgraduate examinations** To accurately monitor and evaluate the impact of any exam changes on differential attainment, we recommend implementing a systematic approach to collecting candidate characteristics at the point of exam application.	
2.1		An appropriate measure of candidate's socioeconomic status should be identified, such as the highest educational qualification of either parent, and added to the exam application. The Fair Exams task and finish group should engage with relevant stakeholders to consider if additional demographic data on variables such as sexual orientation and religion should also be collected.	• Fair Exams Task & Finish Group • FPH Education Committee • FPH
2.2		Data on ethnicity (as per the ethnic groups used in the 2021 census in England), place of primary qualification, disability and disability type should continue to be collected systematically via pre-determined categories (including "other").	
2.3		An appropriate unique identifier should be selected and made mandatory to facilitate linkage across exam sittings, adjustment request applications and application outcomes and enhance compatibility with other datasets.	
2.4		A data dictionary encompassing all data from exam applications should be complied and routinely reviewed and updated to capture changes in definitions or recording practices over time. This ensures data accuracy and reliability of the dataset ensuring consistency in data interpretation for future monitoring and evaluation.	
2.5		Individual candidate performance by question should be routinely stored in the FPH database to enable future analysis of differential attainment beyond overall pass/fail outcomes, by sections of the syllabus or question type within the exam, across exam sittings.	
2.6		The purpose of collecting this data should be shared with candidates at the time of applying to sit the exam in order to encourage participation and reduce missing demographic data.	
2.7		The Fair Exams Task and Finish group should consider linking FPH examination datasets to FPH Registrar training outcome data to identify the cohort of Registrars who leave training due to repeated examination fails. This group is potentially most disadvantaged by differential attainment and further	

	research to identify this group and understand their experiences may support the development of targeted interventions.	
3.	**Understand the unique experiences of candidates from minoritised groups** The analysis presented in this report provides a novel description of the patterns of differential attainment in public health postgraduate exams. However, there are inherent limitations to such a quantitative approach, and existing evidence in the wider literature is drawn from undergraduate and postgraduate medical education in clinical settings. As such, it may not be representative of the workplace training environment and experiences of Public Health specialty trainees.	
3.1	Qualitative research should be conducted with Registrars from demographic groups identified to be affected by differential attainment. The research should aim to explore the learning and workplace experiences of Registrars who have both passed and failed the DFPH and MFPH examination on first attempt, to better understand the causes of, and inform potential interventions to address, differential attainment within a public health context.	• Fair Exams Task & Finish Group
3.2	Qualitative research should be conducted with Educational Supervisors, Training Programme Directors, Heads of Schools and Examiners to further understand the workplace and learning environments and support available to Registrars sitting and resitting the examinations.	• Fair Exams Task & Finish Group
4.	**Inclusive assessment practices** In addition to interventions in the wider workplace and learning environment, it is important to review the DFPH and MFPH assessments themselves to ensure they provide all candidates with an equitable opportunity to demonstrate their knowledge, skills and competence.	
4.1	The demographics and professional backgrounds of the existing pool of examiners, question setters and standard setters for the DFPH and MFPH should be audited and compared to the composition of the wider specialist public health workforce. The results of this audit should be published, and a plan developed to ensure the diversity and inclusivity of the examiner pool.	• Diplomate Examination Development Committee • Final Membership Examination Development Committee
4.2	The current universally accessible information, support resources and practice questions for the DFPH and MFPH examinations should be assessed against the AOMRC principles, to identify opportunities to improve candidates' familiarity with the assessment format, and their opportunities for formative feedback.	• Diplomate Examination Development Committee • Final Membership Examination Development Committee
4.3	The Fair Exams Task & Finish Group should coordinate, review, and recommend high-quality universally accessible formative assessments for the DFPH & MFPH which mirror the summative assessments, working in	• Fair Exams Task & Finish Group

	partnership with the Examination Development Committees. These formative assessments may be used by candidates to support their preparation for the examinations, and by Educational Supervisors and TPDs to support in the early identification of Registrars who may require additional targeted support when preparing for their examination attempt.	
4.4	At the next curriculum review, the Examination Development Committees should invite Registrars and Consultants with diverse backgrounds and experiences to collaboratively evaluate the examination syllabi content using the principles of inclusive curriculum design.	• FPH Curriculum Assessment Committee
4.5	The causes of differential attainment are structural and systematic. However, the impact of differential attainment is borne by the affected individuals. The FPH Education Committee should consider allowing candidates to pay for paper I and II of the DFPH separately to reduce the financial impact of resit examinations, which falls disproportionately on colleagues from certain demographic groups over others.	• Diplomate Examination Development Committee • FPH Education Committee
5.	**Inclusive working and learning environments** Working and learning in a diverse and inclusive workplace has been identified as a key success factor, facilitating progression through postgraduate training.	
5.1	National, regional and local leaders should celebrate colleagues from diverse backgrounds who have overcome barriers to achieve success.	• FPH EDI Committee • Regional Training Programmes
5.2	The FPH EDI Committee and Regional Schools of Public Health should look to develop mentoring programmes to create opportunities for Registrars from minoritised groups to access tailored support and guidance. This may include informal mentoring relationships through networking opportunities.	
5.3	Differential attainment training and support for Educational Supervisors, TPDs and Heads of Schools should be developed and delivered. The training should ensure that supervisors have the necessary knowledge, skills, confidence and resources to support Registrars of all backgrounds, beliefs, and identities.	• SEB • NHSE WTE • Regional Training Programmes
5.4	Regional Schools of Public Health should consider how they can support Registrars to develop peer networks, and ensure they have time to make use of the peer support and mentoring they offer.	• Regional Training Programmes
6.	**Targeted assessment support and feedback** Additional assessment support and feedback should be offered to candidates based on individual learning needs.	
6.1	The Examination Development Committees should provide personalised narrative feedback on areas of strength and weakness against the expected	• Diplomate Examination Development Committee

	standard, for candidates who have failed a paper or examination, in line with AOMRC guidance.	• Final Membership Examination Development Committee
6.2	The development of a targeted assessment support offer pre- or post- first examination attempt should be considered. This could include Differential Attainment Champions in each region, who are trained to support Registrars to reflect on their formative and summative examination feedback, to identify and address their learning needs.	• SEB • Regional Training Programmes
7.	**Evaluation of implemented interventions** There is a need for rigorous evaluation of the impact of implemented interventions targeting differential attainment, with a commitment to share evaluation findings transparently to build our collective understanding.	
7.1	All stakeholders should commit to rigorous evaluation of all implemented interventions and to sharing the results publicly.	• All stakeholders

9. Conclusion

This is the first study to examine for differential attainment in the outcome of passing the FPH membership examinations. Overall, the analysis suggests that some demographic groups are less likely to pass the FPH membership exams on first attempt. The attainment gap persists in multivariable analysis suggesting that age, ethnicity, professional background, and candidate status are each independently associated with candidates' likelihood of passing the DFPH exam on the first attempt. For the MFPH exam, odds of passing the exam on the first attempt varied by age and ethnicity. These findings are in line with those from other postgraduate medical examinations, and across the educational sector more broadly.

The causes of differential attainment are multi-faceted and complex. The attainment gap is likely to result from differential experiences arising from systematic and structural inequities throughout the educational and workplace training pathway[2]. Recommendations made in this report are made based on existing literature, recognising the need for more rigorous evaluation of implemented interventions. To effectively address differential attainment in public health postgraduate exams, we need to better understand the experiences and perspectives of candidates and wider stakeholders from disadvantaged groups. Their active involvement, alongside recognition and reward for their work, is necessary to address the limitations in this quantitative approach, better recognise intersectionality, and to design credible interventions within the public health context.

Differential attainment is inherently unfair. The significant impact of examination failure on affected individuals' physical, mental, and social wellbeing, in addition to the impact on their workplace learning opportunities and subsequent career progression, should not be underestimated. For public health as a discipline, differential attainment in postgraduate exams threatens our ability to build an inclusive, diverse, and representative workforce. The findings of this report demonstrate that attempts to 'be fair' in all aspects of examinations have not yet reduced differential attainment and so there is an urgent need for action, informed by the growing evidence base and colleagues' lived experience. We all have a role to play in building inclusive workplaces and learning environments, and in providing equitable support and sponsorship to colleagues from disadvantaged groups.

10. References

1. Kelly L, Sankaranarayanan S. Differential attainment: how can we close the gap in paediatrics? Archives of Disease in Childhood Education & Practice. 2023;108(1):54-7.
2. Fyfe M, Horsburgh J, Blitz J, Chiavaroli N, Kumar S, Cleland J. The do's, don'ts and don't knows of redressing differential attainment related to race/ethnicity in medical schools. Perspectives on Medical Education. 2022;11:1-14.
3. GMC. Tackling differential attainment N.D. [Available from: https://www.gmc-uk.org/education/standards-guidance-and-curricula/guidance/tackling-differential-attainment#:~:text=Differentials%20that%20exist%20because%20of,to%20be%20fair%20for%20everyone.].
4. GMC. Tackling disadvantage in medical education. Analysis of postgraduate outcomes by ethnicity and the interplay with other personal characteristics 2023.
5. Mountford-Zimdars A, Sanders J, Jones S, Sabri D, Moore J. Causes of differences in student outcomes, Higher Education Funding Council for England. 2015.
6. Woolf K, Rich A, Viney R, Rigby M, Needleman S, Griffin A. Fair training pathways for all: understanding experiences of progression. General Medical Council. 2016.
7. Brown C, Goss C, Sam AH. Is the awarding gap at UK medical schools influenced by ethnicity and medical school attended? A retrospective cohort study. BMJ Open. 2023;13(12):e075945.
8. Bolton P, Lewis J. Equality of access and outcomes in higher education in England. London: House of Commons Library; 2023.
9. Beebeejaun K, Littleford K. A diverse public health workforce is more important than ever. British Medical Journal Publishing Group; 2023.
10. Faculty of Public Health. FPH Equality and Diversity Statement 2019 [Available from: https://www.fph.org.uk/media/2790/fph-equality-and-diversity-statement-nov-19.pdf].
11. Faculty of Public Health. Workforce: recruitment, training and retention in health and social care.; 2022.
12. Health Education England. Diversity Data Dashboard. 2018.
13. FPH. Faculty of Public Health Anti-racism Framework. 2023.
14. Bury F, Pinder RJ. Equality, diversity and inclusion in recruitment to Public Health specialty training in the United Kingdom. London, UK: Imperial College London,; 2022.
15. UKPHR. How to apply for specialist registration. 2023 [Available from: https://ukphr.org/how-to-apply-for-specialist-registration/].
16. FPH. Portfolio Pathways to Registration N.D. [Available from: https://www.fph.org.uk/training-careers/specialty-training/portfolio-pathway/].
17. Universities UK & NSS. Black, Asian and Minority Ethnic Student Attainment at UK Universities: #ClosingtheGap. London; 2019.
18. Ellis R, Brennan PA, Lee AJ, Scrimgeour DSG, Cleland J. Differential attainment at the Intercollegiate Membership of the Royal Colleges of Surgeons (MRCS) examination according to gender, ethnicity, age and socioeconomic factors. British Journal of Surgery. 2022;109(Supplement 4):iv3.
19. Tiffin PA, Paton LW. Differential attainment in the MRCPsych according to ethnicity and place of qualification between 2013 and 2018: a UK cohort study. Postgraduate Medical Journal. 2021;97(1154):764-76.
20. Scrimgeour DSG, Cleland J, Lee AJ, Brennan PA. Which factors predict success in the mandatory UK postgraduate surgical exam: The Intercollegiate Membership of the Royal College of Surgeons (MRCS)? Surgeon Journal of the Royal Colleges of Surgeons of Edinburgh & Ireland. 2018;16(4):220-6.
21. Scrimgeour DSG, Cleland J, Lee AJ, Brennan PA. Factors predicting success in the Intercollegiate Membership of the Royal College of Surgeons (MRCS) examination: a summary for OMFS. British Journal of Oral & Maxillofacial Surgery. 2018;56(7):567-70.

22.   Woolf K, Potts HWW, McManus IC. Ethnicity and academic performance in UK trained doctors and medical students: systematic review and meta-analysis. BMJ. 2011;342:d901.

23.   Robinson DBT, Hopkins L, James OP, Brown C, Powell AG, Abdelrahman T, et al. Egalitarianism in surgical training: let equity prevail. Postgraduate Medical Journal. 2020;96(1141):650-4.

24.   GMC. What is differential attainment? N.D. [Available from: https://www.gmc-uk.org/education/standards-guidance-and-curricula/guidance/tackling-differential-attainment/what-is-differential-attainment].

25.   GMC. Tackling disadvantage in medical education Manchester, UK; 2023.

26.   Woolf K, Rich A, Viney R, Needleman S, Griffin A. Perceived causes of differential attainment in UK postgraduate medical training: a national qualitative study. BMJ open. 2016;6(11):e013429.

27.   Yeates P, Woolf K, Benbow E, Davies B, Boohan M, Eva K. A randomised trial of the influence of racial stereotype bias on examiners' scores, feedback and recollections in undergraduate clinical exams. Bmc Medicine. 2017;15(1):1-11.

28.   Dewhurst NG, McManus C, Mollon J, Dacre JE, Vale AJ. Performance in the MRCP(UK) Examination 2003–4: analysis of pass rates of UK graduates in relation to self-declared ethnicity and gender. BMC Medicine. 2007;5(1):8.

29.   Woolf K. Differential attainment in medical education and training. BMJ. 2020;368:m339.

30.   Woolf K, McManus IC, Potts HW, Dacre J. The mediators of minority ethnic underperformance in final medical school examinations. British Journal of Educational Psychology. 2013;83(1):135-59.

31.   Selvarajah S, Deivanayagam TA, Lasco G, Scafe S, White A, Zembe-Mkabile W, et al. Categorisation and Minoritisation. BMJ Global Health. 2020;5(12):e004508.

32.   Gomez LE, Bernet P. Diversity improves performance and outcomes. Journal of the National Medical Association. 2019;111(4):383-92.

33.   FPH. Membership of the Faculty of Public Health exams N.D. [Available from: https://www.fph.org.uk/training-careers/the-diplomate-dfph-and-final-membership-examination-mfph/].

34.   FPH. Board and Committees N.D. [Available from: https://www.fph.org.uk/about-fph/board-and-committees/].

35.   FPH. Public Health Specialty Training Curriculum 2022. 2022.

36.   COPMED. A Reference Guide for Postgraduate Foundation and Specialty Training in the UK. 2022.

37.   FPH. Apply for the Diplomate Examination (DFPH) N.D. [Available from: https://www.fph.org.uk/training-careers/the-diplomate-dfph-and-final-membership-examination-mfph/the-diplomate-examination-dfph/apply-for-the-diplomate-examination-dfph/].

38.   FPH. Changes to standard setting arrangements from January 2017. 2016.

39.   FPH. Diplomate Examination (DFPH) Results and Feedback. N.D.

40.   FPH. The Faculty of Public Health Final Membership Examination N.D. [Available from: https://www.fph.org.uk/training-careers/the-diplomate-dfph-and-final-membership-examination-mfph/the-faculty-of-public-health-final-membership-examination/].

41.   FPH. Examinations Policy For Candidates Requiring Adjustments. 2023.

42.   Ellis R, Brennan PA, Lee AJ, Scrimgeour DS, Cleland J. Differential attainment at MRCS according to gender, ethnicity, age and socioeconomic factors: a retrospective cohort study. J R Soc Med. 2022;115(7):257-72.

43.   Yvette P, Yoav B-S. Older doctors and progression through specialty training in the UK: a cohort analysis of General Medical Council data. BMJ Open. 2015;5(2):e005658.

44.   BMA. Disability in the medical profession Survey findings 2020. 2020.

45.   Asghar ZB, Siriwardena AN, Elfes C, Richardson J, Larcombe J, Neden KA, et al. Performance of candidates disclosing dyslexia with other candidates in a UK medical

licensing examination: cross-sectional study. Postgraduate Medical Journal. 2018;94(1110):198-203.

46.   Ellis R, Brennan P, Cleland J, Lee A, Scrimgeour D. The Impact of Disability on Performance in the Intercollegiate Membership of the Royal College of Surgeons examination (MRCS). British Journal of Surgery. 2021;108(SUPPL 7):vii94.

47.   Asghar Z, Williams N, Denney M, Siriwardena AN. Performance in candidates declaring versus those not declaring dyslexia in a licensing clinical examination. Medical Education. 2019;53(12):1243-52.

48.   Shaw SCK, Anderson JL. Doctors with dyslexia: a world of stigma, stonewalling and silence, still? MedEdPublish. 2017;6(29):29.

49.   Smith F, Goldacre MJ, Lambert TW. Working as a doctor when chronically ill or disabled: comments made by doctors responding to UK surveys. JRSM Open. 2016;7(7):2054270416649282.

50.   Roe V, Patterson F, Kerrin M, Edwards H. "What supported your success in training?" A qualitative exploration of the factors associated with an absence of an ethnic attainment gap in post-graduate specialty training. Work Psychology Group; 2019.

51.   Academy of Medical Royal Colleges. Principles for exam preparation, feedback and support for candidates to address the awarding gap. 2023.

52.   Rodríguez JE, Campbell KM, Pololi LH. Addressing disparities in academic medicine: what of the minority tax? BMC medical education. 2015;15(1):1-5.

53.   Sullivan LW, Mittman IS. The state of diversity in the health professions a century after Flexner. Academic Medicine. 2010;85(2):246-53.

54.   Campbell KM, Hudson BD, Tumin D. Releasing the net to promote minority faculty success in academic medicine. Journal of Racial and Ethnic Health Disparities. 2020;7:202-6.

55.   Cyrus KD. Medical education and the minority tax. Jama. 2017;317(18):1833-4.

56.   Joseph OR, Flint SW, Raymond-Williams R, Awadzi R, Johnson J. Understanding healthcare students' experiences of racial bias: A narrative review of the role of implicit bias and potential interventions in educational settings. International journal of environmental research and public health. 2021;18(23):12771.

57.   Osseo-Asare A, Balasuriya L, Huot SJ, Keene D, Berg D, Nunez-Smith M, et al. Minority resident physicians' views on the role of race/ethnicity in their training experiences in the workplace. JAMA network open. 2018;1(5):e182723-e.

58.   Sawatsky AP, Beckman TJ, Hafferty FW. Cultural competency, professional identity formation and transformative learning. Medical Education. 2017;51(5):462-4.

59.   GMC. How to support successful training for black, and minority ethnic doctors: Actions and case studies for medical royal colleges and faculties N.D.

60.   Lucey CR, Hauer KE, Boatright D, Fernandez A. Medical education's wicked problem: achieving equity in assessment for medical learners. Academic Medicine. 2020;95(12S):S98-S108.

61.   Odom KL, Roberts LM, Johnson RL, Cooper LA. Exploring obstacles to and opportunities for professional success among ethnic minority medical students. Academic medicine. 2007;82(2):146-53.

62.   van Andel CE, Born MP, Themmen AP, Stegers-Jager KM. Broadly sampled assessment reduces ethnicity-related differences in clinical grades. Medical Education. 2019;53(3):264-75.

63.   Zieky M. Fairness in Test Design and Development. 2016. p. 9-31.

64.   van der Vleuten CP, Schuwirth LW. Assessing professional competence: from methods to programmes. Med Educ. 2005;39(3):309-17.

65.   Razack S, Risør T, Hodges B, Steinert Y. Beyond the cultural myth of medical meritocracy. Med Educ. 2020;54(1):46-53.

66.   Clauser BE, Mazor KM. Using Statistical Procedures To Identify Differentially Functioning Test Items. An NCME Instructional Module. Educational Measurement: issues and practice. 1998;17(1):31-44.

67.   Swaminathan H, Rogers HJ. Detecting differential item functioning using logistic regression procedures. Journal of Educational measurement. 1990;27(4):361-70.

68.   Tavakol M, Pinner G. Using the Many-Facet Rasch Model to analyse and evaluate the quality of objective structured clinical examination: a non-experimental cross-sectional design. BMJ open. 2019;9(9):e029208.

69.   Sidhu NS, Fleming S. Re-examining single-moment-in-time high-stakes examinations in specialist training: A critical narrative review. Medical Teacher.1-9.

70.   Nicholson S, Cleland J. "It's making contacts": notions of social capital and implications for widening access to medical education. Advances in Health Sciences Education. 2017;22:477-90.

71.   Beagan BL. 'Is this worth getting into a big fuss over?'Everyday racism in medical school. Medical education. 2003;37(10):852-60.

72.   Brown J, Jenkins L, Sandars J, Bridson J, Patel M. Evaluation of the impact of the Royal College of Psychiatrists Clinical Assessment of Skills and Competencies masterclass on reducing the attainment gap. Edge Hill University, Health Education England North West,; 2023

73.   General Medical Council. National Training Survey 2022 Results. 2022.

74.   Brown J, Jenkins L. Evaluation of the impact of the Differential Attainment Champion role in the GP School, Health Education North-West Edge Hill University; 2023.

75.   Brown J, Jenkins L, Bridson J-M. Exploring the impact of the Differential Attainment Champion role in the GP School, Health Education North West (HEENW). Association for the Study of Medical Education. ; 2023.

76.   Academy of Medical Royal Colleges. Guidance in standards for candidate feedback: Summative postgraduate medical examinations in the United Kingdom. 2015.

77.   Hawkridge A, Molyneux D. A description and evaluation of an educational programme for North West England GP trainees who have multiple fails in the Clinical Skills Assessment (CSA). Education for Primary Care. 2019;30(3):167-72.

11. Appendix

Figure A1. DFPH Marking Algorithm

The Faculty of Public Health Diplomate Examination (DFPH)
EXECUTIVE GROUP EXAMINERS' CHECK LIST
– MARKING ALGORITHM –
EFFECTIVE MARCH 2023

Paper I

Has the candidate:

- scored the agreed Angoff set pass mark for Paper I
- **and** passed 7 questions

Paper II

Has the candidate:

- scored the agreed Angoff set pass mark for Paper II overall?
- passed 5 out of 9 questions across Paper IIA and Paper IIB
- passed at least two questions in each paper (IIA and IIB)

Fail Paper I

Fail Paper II

Banked Paper I

Fail

Banked Paper II

Candidates must pass papers I & II separately in order to pass overall

PASS

Figure A2. MFPH Results Checklist

Five Competencies:

1) Presenting communication skills
2) Listening & comprehending communication skills
3) Ability to assimilate relevant information
4) Ability to demonstrate appropriate reasoning, analytical and judgement skills
5) Ability to handle uncertainty, the unexpected, challenge and conflict appropriately

The Faculty of Public Health Final Membership Examination (MFPH) Results Checklist

Has the candidate scored less than satisfactory (6) as an average on all competencies?

YES → **FAIL**

NO ↓

Has the candidate scored less than satisfactory on each competency at more than three stations? (e.g. More than three Ds)

YES → **FAIL**

NO ↓

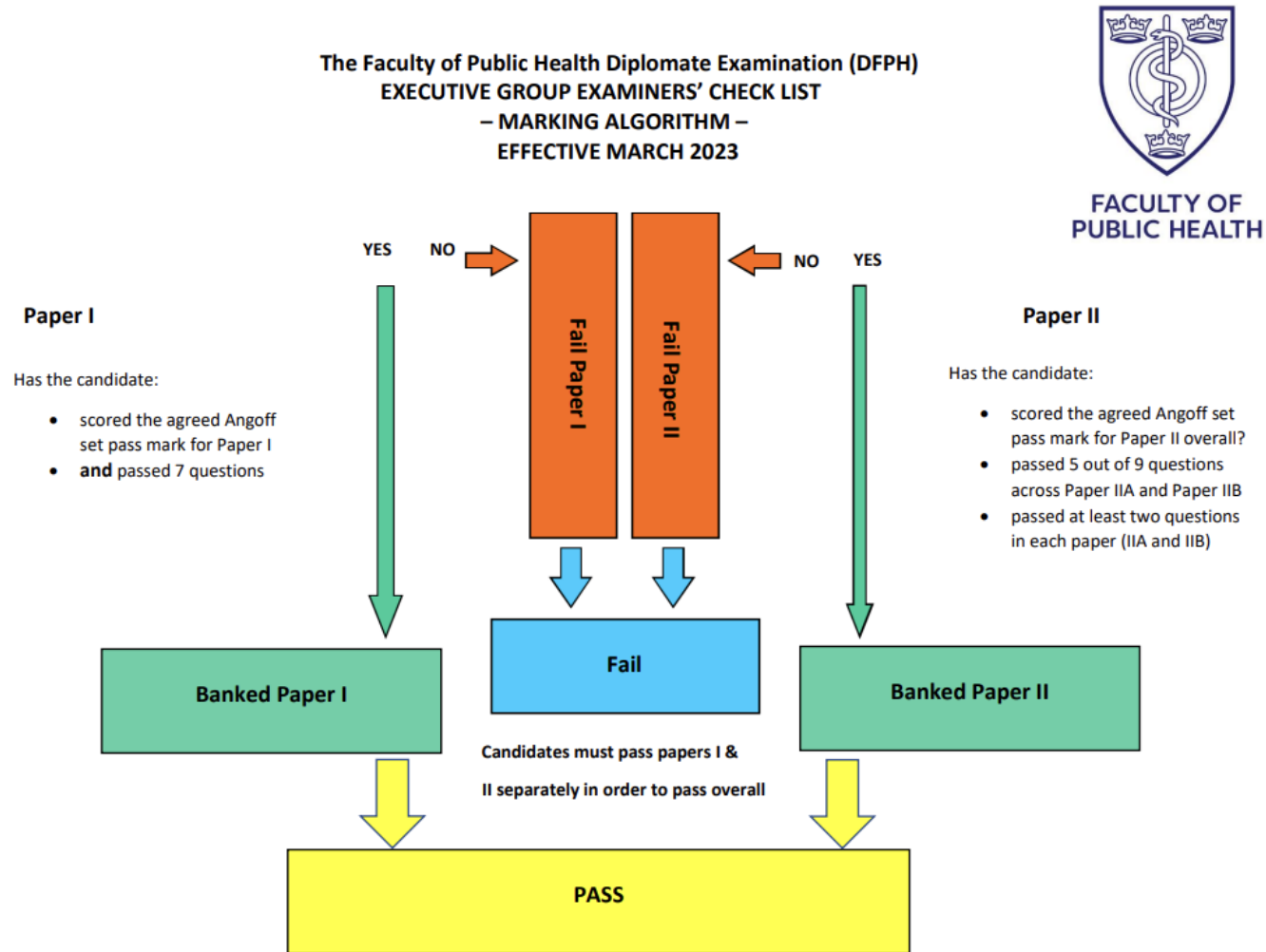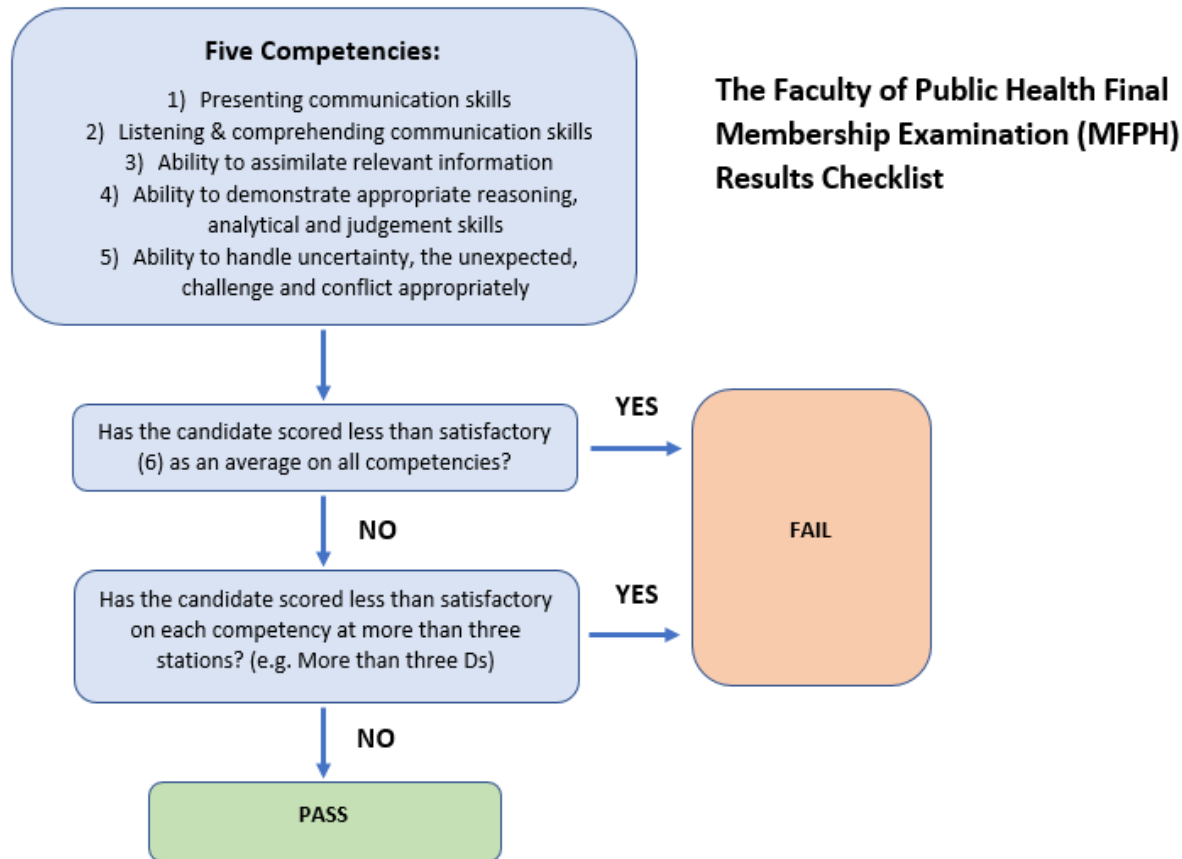**PASS**

Table A1. Descriptive breakdown of cohort that sat DFPH (first attempt) by exam outcome, 2012 - 2022 (n=1,194)

Variable	Overall, N = 1,194	Fail, N = 320	Passed one paper, N = 249	Pass both papers, N = 625
Median age at exam	32.0 (6.0)	34.0 (6.0)	33.0 (7.0)	32.0 (6.0)
Missing	236	182	44	10
Sex				
Female	812 (69%)	200 (64%)	168 (69%)	444 (72%)
Male	361 (31%)	113 (36%)	76 (31%)	172 (28%)
Missing	21	7	5	9
Ethnicity				
White British	595(60%)	89 (34.5%)	125 (60.1%)	381 (73%)
White Other	95 (9.6%)	27 (10.5%)	22 (10.6%)	46 (8.8%)
Asian	75 (7.8%)	27 (10.5%)	17 (8.2%)	31 (5.9%)
Black	54 (5.5%)	43 (16.7%)	7 (3.4%)	<5 (0.77%)
Chinese	104 (10.5%)	54 (20.9%)	26 (12.5%)	24 (4.6%)
Mixed	23(2.3%)	<5 (1.7%)	<5 (1.9%)	16 (3.1%)
Other	42(4.3%)	15 (5.8%)	7 (3.4%)	20 (3.8%)
Missing	206	62	41	103
Disability				
No	1,093 (92%)	293 (92%)	229 (92%)	571 (91%)
Yes	100 (8.0%)	26 (8.0%)	20 (8.0%)	54 (8.6%)
Unknown	<5	<5	0	0
Adjustment approved				
No adjustment regardless of requested or not	1,123 (94%)	303 (95%)	234 (94%)	586 (94%)
Yes	71 (5.9%)	17 (5.3%)	15 (6.0%)	39 (6.2%)
Medical vs BOTM				
Medical	573 (48%)	120 (38%)	107 (43%)	346 (55%)
BOTM	621 (52%)	200 (62%)	142 (57%)	279 (45%)
UK Training Region				
Defence	9 (0.8%)	<5 (0.6%)	<5 (1.2%)	<5 (0.6%)
East Midlands	61 (5.1%)	10 (3.1%)	6 (2.4%)	45 (7.2%)
East of England	85 (7.1%)	8 (2.5%)	27 (11%)	50 (8.0%)
London/KSS	196 (16%)	20 (6.2%)	35 (14%)	141 (23%)
Missing	300 (25%)	195 (61%)	60 (24%)	45 (7.2%)
North East	42 (3.5%)	8 (2.5%)	10 (4.0%)	24 (3.8%)
North West	94 (7.9%)	14 (4.4%)	18 (7.2%)	62 (9.9%)
Northern Ireland	16 (1.3%)	<5 (0.9%)	<5 (0.8%)	11 (1.8%)
Scotland	47 (3.9%)	7 (2.2%)	7 (2.8%)	33 (5.3%)
South West	70 (5.9%)	12 (3.8%)	12 (4.8%)	46 (7.4%)
Thames Valley	47 (3.9%)	7 (2.2%)	11 (4.4%)	29 (4.6%)
Wales	29 (2.4%)	5 (1.6%)	8 (3.2%)	16 (2.6%)
Wessex	37 (3.1%)	5 (1.6%)	8 (3.2%)	24 (3.8%)
West Midlands	99 (8.3%)	19 (5.9%)	27 (11%)	53 (8.5%)
Yorkshire & Humber	62 (5.2%)	5 (1.6%)	15 (6.0%)	42 (6.7%)
Candidate status				
UK Registrar	904 (76%)	132 (41%)	190 (76%)	582 (93%)
HKCCM	124 (10%)	69 (22%)	33 (13%)	22 (3.5%)
Outside of public health specialty training	166 (14%)	119 (37%)	26 (10%)	21 (3.4%)
Year of exam sitting				
2012-2013	243 (20.4%)	97 (30.3%)	56 (22.5%)	90 (14.4%)
2014-2016	314 (26.3%)	88 (27.5%)	79 (31.7%)	147 (23.5%)
2017-2019	309 (25.9%)	63 (19.7%)	55 (22.1%)	191 (30.6%)
2020-2022	328 (27.5%)	72 (22.5%)	59 (23.7%)	197 (31.5%)

Table A2. DFPH exam outcome (passed both papers) on first attempt by demographics and professional background: univariable and multivariable analysis, 2012-2022 (n=977)

Variable	N	Unadjusted OR (95% CI)	Unadjusted P value	Adjusted OR (95% CI)	Adjusted P value
Age	977	0.95(0.92-0.97)	<0.01	0.95(0.93-0.99)	<0.01
Sex					
Female	678	Ref		Ref	
Male	299	0.77(0.59-1.02)	0.07	0.89(0.64-1.2)	0.47
Ethnicity					
White British	589	Ref		Ref	
White Other	95	0.53(0.34-0.82)	<0.01	0.59(0.36-0.97)	0.04
Asian	73	0.42(0.25-0.68)	<0.01	0.44(0.25-0.79)	<0.01
Black	53	0.05(0.02-0.13)	<0.01	0.10(0.03-0.30)	<0.01
Chinese	103	0.17(0.1-0.28)	<0.01	0.88(0.30-2.58)	0.82
Mixed	23	1.28(0.52-3.17)	0.57	1.55(0.55-4.32)	0.41
Other	41	0.59(0.32-1.07)	0.08	0.69(0.32-1.52)	0.36
Professional background					
Medical	465	Ref		Ref	Ref
BOTM	512	0.57(0.44-0.73)	<0.01	0.63(0.46-0.87)	0.01
Candidate status					
UK Registrar	758	Ref		Ref	
HKCCM	92	0.12(0.07-0.2)	<0.01	0.11(0.04-0.35)	<0.01
Outside of public health specialty training	127	0.07(0.04-0.12)	<0.01	0.12(0.07-0.23)	<0.01
Year of exam sitting					
2012-2013	222	Ref		Ref	
2014-2016	259	1.34(0.93-1.93)	0.12	1.26(0.84-1.90)	0.26
2017-2019	227	3.46(2.35-5.11)	<0.01	3.02(1.95-4.67)	<0.01
2020-2022	269	2.70(1.87-3.89)	<0.01	2.90(1.90-4.43)	<0.01

*The final multivariable regression model included all variables on the table.

Table A3. DFPH exam outcome (passed both papers) on first attempt by demographics and professional background for UK Public Health Registrars only: univariable and multivariable analysis, 2012-2022 (n=758)

Variable	N	Unadjusted OR (95% CI)	Unadjusted P value	Adjusted OR (95% CI)	Adjusted P value
Age	758	0.95(0.92-0.98)	<0.01	0.96(0.93-0.99)	0.03
Ethnicity					
White British	556	Ref		Ref	
White Other	77	0.75(0.46-1.22)	0.24	0.68(0.41-1.14)	0.14
Asian	53	0.61(0.34-1.07)	0.09	0.43(0.24-0.80)	<0.01
Black	18	0.14(0.05-0.44)	<0.01	0.13(0.04-0.41)	<0.01
Chinese	11	1.34(0.35-5.11)	0.67	0.91(0.23-3.65)	0.89
Mixed	19	1.41(0.50-3.97)	0.52	1.14(0.39-3.36)	0.81
Other	24	1.01(0.42-2.39)	0.08	0.65(0.26-1.61)	0.35
Professional background					
Medical	382	Ref		Ref	Ref
BOTM	376	0.57(0.42-0.76)	<0.01	0.60(0.42-0.85)	<0.01
Year of exam sitting					
2012-2013	158	Ref		Ref	
2014-2016	195	1.32(0.87-2.01)		1.28(0.83-1.98)	0.26
2017-2019	198	3.28(2.09-5.12)		3.26(2.06-5.18)	<0.01
2020-2022	207	3.57(2.28-5.58)		3.29(2.07-5.21)	<0.01

*The final multivariable regression model included all variables in the table.

Table A4. DFPH exam attempts by demographics and professional background

	One attempt (n= 726)	Two attempts (n = 277)	Three attempts (n=102)	4-6 attempts (n=79)	≥7 attempts (n=9)
Median age (IQR)	32 (29.6-36.3)	32 (29.7-36.2)	33 (30.1-36.9)	34 (31.7-39.8)	35 (34.5-42.7)
Sex					
Male	215 (29.6)	80 (28.9)	33 (32.4)	29 (36.7)	<5 (44.4)
Female	500 (68.9)	192 (69.3)	66 (64.7)	49 (62)	5 (55.6)
Not known	11 (1.5)	5 (1.8)	<5 (2.9)	<5 (2.5)	0 (0)
Ethnicity					
White British	387 (53.3)	131 (47.3)	46 (45.1)	30 (38)	<5 (11.1)
White Other	55 (7.6)	28 (10.1)	6 (5.9)	5 (6.3)	<5 (11.1)
Asian	41 (5.6)	22 (7.9)	8 (7.8)	<5 (5.1)	0 (0)
Black	28 (3.9)	14 (5.1)	<5 (2.9)	9 (11.4)	0 (0)
Chinese	41 (5.6)	26 (9.4)	13 (12.7)	19 (24.1)	5 (55.6)
Mixed	16 (2.2)	<5 (1.1)	<5 (3.9)	0 (0)	0 (0)
Other	30 (4.1)	6 (2.2)	5 (4.9)	<5 (1.3)	0 (0)
Not known	128 (17.6)	47 (17)	17 (16.7)	11 (13.9)	2 (22.2)
Professional background					
Medical	372 (51.2)	121 (43.7)	39 (38.2)	33 (41.8)	7 (77.8)
BOTM	354 (48.8)	156 (56.3)	63 (61.8)	46 (58.2)	<5 (22.2)
Candidate status					
UK Registrar	570 (78.5)	201 (72.6)	78 (76.5)	52 (65.8)	<5 (33.3)
HKCCM	47 (6.5)	32 (11.6)	17 (16.7)	22 (27.8)	6 (66.7)
Outside of PH specialty training	109 (15)	44 (15.9)	7 (6.9)	5 (6.3)	0 (0)

Table A5. DFPH exam outcome (passed both papers vs failed both papers) on first attempt by demographics and professional background: multivariable analysis, 2012-2022 (n=771)

Variable	N	Unadjusted OR (95% CI)	Unadjusted P value	Adjusted OR (95% CI)	Adjusted P value
Age	771	0.92(0.90-0.95)	<0.01	0.94(0.90-0.97)	<0.01
Sex					
Female	535	Ref		Ref	
Male	236	0.70(0.51-0.96)	0.03	0.80(0.52-1.23)	0.31
Ethnicity					
White British	465	Ref		Ref	
White Other	73	0.40(0.23-0.67)	<0.01	0.52(0.27-1.00)	0.05
Asian	56	0.29(0.16-0.51)	<0.01	0.40(0.19-0.84)	0.01
Black	46	0.02(0.01-0.06)	<0.01	0.06(0.02-0.21)	0.00
Chinese	78	0.10(0.06-0.18)	<0.01	0.63(0.17-2.31)	0.49
Mixed	19	1.24(0.35-4.37)	0.73	1.79(0.37-8.65)	0.47
Other	34	0.30(0.14-0.60)	<0.01	0.58(0.22-1.54)	0.27
Professional background					
Medical	374	Ref		Ref	
BOTM	397	0.48(0.37-0.64)	<0.01	0.61(0.39-0.94)	0.03
Candidate status					
UK Registrar	596	Ref		Ref	
HKCCM	68	0.07(0.04-0.13)	<0.01	0.08(0.02-0.31)	<0.01

Outside of Public Health Specialty training	107	0.03(0.02-0.06)	<0.01	0.07(0.03-0.14)	<0.01
Year of exam sitting					
2012-2013	169	Ref		Ref	
2014-2016	192	1.55(1.02-2.35)	0.04	1.49(0.88-2.51)	0.14
2017-2019	190	4.28(2.68-6.85)	<0.01	3.33(1.87-5.92)	<0.01
2020-2022	220	3.19(2.07-4.90)	<0.01	4.19(2.36-7.45)	<0.01

Table A6. DFPH exam outcome (passed both papers vs failed both papers) on first attempt by demographics and professional background for UK public health registrars only: multivariable analysis, 2012-2022 (n=596)

Variable	N	Unadjusted OR (95% CI)	Unadjusted P value	Adjusted OR (95% CI)	Adjusted P value
Age	596	0.93(0.89-0.97)	<0.01	0.93(0.89-0.97)	<0.01
Ethnicity					
White British	442	Ref		Ref	
White Other	59	0.69(0.35-1.34)	0.27	0.68(0.33-1.39)	0.29
Asian	38	0.63(0.28-1.38)	0.25	0.49(0.21-1.17)	0.11
Black	12	0.10(0.03-0.33)	<0.01	0.09(0.02-0.35)	<0.01
Chinese	10	0.78(0.16-3.74)	0.75	0.52(0.10-2.81)	0.45
Mixed	16	1.36(0.30-6.12)	0.69	0.84(0.18-4.00)	0.83
Other	19	1.04(0.29-3.65)	0.95	0.73(0.20-2.76)	0.65
Adjustment approved					
No	554	Ref		Ref	
Yes	42	0.61(0.29-1.25)	0.17	0.40(0.18-0.87)	0.02
Year of exam sitting					
2012-2013	115	Ref		Ref	
2014-2016	142	1.57(0.92-2.69)	0.10	1.64(0.93-2.92)	0.09
2017-2019	169	3.76(2.07-6.83)	<0.01	3.90(2.09-7.30)	<0.01
2020-2022	170	7.02(3.48-14.16)	<0.01	7.46(3.57-15.57)	<0.01

Table A7. MFPH exam outcome (pass vs fail) on first attempt by demographics and professional background: multivariable analysis, 2012-2022 (n=675)

Variable	N	Unadjusted OR (95% CI)	Unadjusted P value	Adjusted OR (95% CI)	Adjusted P value
Age	675	0.93(0.9-0.97)	<0.01	0.94(0.9-0.98)	<0.01
Ethnicity					
White British	489	Ref		Ref	
White Other	67	0.53(0.26-1.08)	0.08	0.57(0.27-1.17)	0.13
Asian	45	0.48(0.21-1.09)	0.08	0.40(0.17-0.92)	0.03
Black	19	0.09(0.04-0.24)	<0.01	0.12(0.04-0.32)	<0.01
Chinese	13	1.25(0.16-9.8)	0.83	0.78(0.10-6.35)	0.82
Mixed	15	0.67(0.15-3.08)	0.61	0.51(0.11-2.40)	0.40
Other	27	0.60(0.20-1.80)	0.36	0.54(0.18-1.67)	0.29
Year of exam sitting					
2012-2013	143	Ref			
2014-2016	137	1.81(0.91-3.58)	0.09	1.71(0.84-3.51)	0.14
2017-2019	216	1.38(0.78-2.45)	0.27	1.17(0.64-2.13)	0.62
2020-2022	179	3.39(1.61-7.14)	<0.01	2.89(1.33-6.24)	<0.01

FACULTY OF PUBLIC HEALTH