Institution:
Queen Mary University of London

Unit of Assessment: UoA2

1. UNIT CONTEXT AND STRUCTURE, RESEARCH AND IMPACT STRATEGY

1A. Overview: Unit context and structure

Research in this UoA is carried out by 42 staff mostly working in the Institute of Population Health Sciences (IPHS). The Institute, inaugurated in 2019, arose from the ambition of the School of Medicine and Dentistry (SMD) at Queen Mary to consolidate its success in research in public health, primary care and health services research. The focus has been to produce the highest quality research to respond to the needs of the local East London population, which experiences amongst the worst levels of healthy life expectancy and life expectancy in London and the UK. The IPHS brings together the Unit for Social and Community Mental Health and the Centres for Primary Care and Public Health, Global Health, Women's Health, and Clinical Trials.

There is collaboration with the Wolfson Institute of Preventive Medicine (nutrition, smoking, cancer, trials), the Blizard Insitute (pollution, child health) and across the medical school and wider university.

UoA2 staff play key roles in UCL Partners (Queen Mary is a founding partner) which oversees the Academic Health Sciences Network and Academic Health Sciences Centre (Thornton is Deputy Director). In 2013, with UCL, Queen Mary formed the successful Collaboration for Leadership in Applied Health Research and Care (CLAHRC) North Thames, renewed as a five year Applied Research Collaboration (£9m; 2019). In 2020, we became a collaborator in the Prevention Research Partnership funded consortium (ActEarly) a north-south collaboration to tackle upstream causes of inequalities (£7m, Sheldon). Our primary care research was recognised nationally in 2020 through inclusion in the NIHR School for Primary Care Research (£20m; Griffiths, Taylor, Robson, Eldridge, Swinglehurst, Sheldon and others). We have also led Queen Mary involvement in pan-London collaborations such as the Health Data Research UK (HDR UK) London Centre (£6.9m jointly with KCL, UCL, Imperial, LSHTM; Dezateux, Eldridge), and an eight-year Wellcome Trust Doctoral Training programme on health data (£5.5m; Dezateux, Eldridge, Swinglehurst) which trains 30 students over five years (from 2021). We lead the East London arm of the renewed NIHR Research Design Service London (£6.3m; Hooper, Taylor).

Research income has grown from £5.5m per year in the 2008-2013 period to £9.5m per year over the seven years of this period (August 2013 to July 2020).

1B. Strategic Research Aims and Impacts post-REF2014

Our overarching strategic aims (abbreviated throughout as SA) post-REF2014 were to:
(i) consolidate new groups
(ii) build a cadre of strong independent researchers via fellowships and promotions
(iii) expand in areas of research strength
(iv) develop the infrastructure and capacity for research impact.

Our progress is described below.

Our overall growth during this REF period is demonstrated by the increased number of staff returned in UoA2 from 23 (20.6 FTE; 6 early career researchers [ECR's]) in 2014 to 42 (34.75 FTE, including 7 ECR's) in this submission. There have been 42 fellowships awarded and 6 staff promoted to senior research roles (see section 2 for more details).

The research submitted in UoA2 has been organised into the key areas below, although our research ethos is collaborative, interdisciplinary and cross-cutting. These areas are: Mental Health, Respiratory, Self-management and Behaviour Change, Health Data, Clinical Trials and Methodology, Global Health and Women's Health. This strategy complements that set out in UoA1, and together provides an holistic approach to addressing the health needs of our local East London population, with global application.

Mental Health Research (SAiii,iv) The Unit for Social and Community Psychiatry brings together expertise in health and social care. It recognises the importance of mental ill health as a co-morbidity alongside other long-term conditions. Priebe leads the Unit which focuses on how social interactions can reduce mental distress, particularly interventions involving clinicians, patients, families and communities. The Unit is the only mental health-related WHO Collaborating Centre for Mental Health Service Development. Since 2014, we have evaluated the impact of having the same psychiatrist for both in- and out-patient care (COFI, Priebe, Bird, €5m EC) and developed DIALOG+ which turns routine patient-clinician meetings into therapeutically effective interventions (EPOS, £1.2m, Programme Grant for Applied Research), Priebe, Eldridge). DIALOG+ has been taken up in the NHS and elsewhere (see Impact Case Study) and has led to research programmes for patients with chronic depression in the UK (TACK, £2.5m, PGfAR, Bird, Kerry) and in five Balkan countries (IMPULSE, €2.4m EC, Jovanovic). The unit hosts a NIHR Global Health Research Group on Developing Psycho-Social Interventions (£2m, Priebe with Bird; *Psychother Psychosom 2015*), which tests DIALOG+, family involvement and befriending in Bosnia-Herzegovina, Colombia, Uganda, Argentina, Pakistan and Peru. An MRC Project (BRICs; Bird, Priebe) is testing DIALOG+ in disadvantaged adolescents with the Javeriana University in Bogotá (*Lancet Glob Health 2019*).

Group-based body psychotherapy was tested against Pilates (NESS, £1.4m, HTA, Priebe, Eldridge) and demonstrated no overall benefit although a positive effect in women was evident. A recent trial tested art, music and dance-movement therapy (ERA, £1.4m, HTA, Carr). Family involvement in in-patient care was studied, identifying patient preferences and practical options for implementing family involvement early after admission (*JAMA Psych 2016*). Relationships with volunteers through befriending were evaluated in the VOLUME trial (£1.4m, NIHR PGfAR, Priebe) which led to increased social contact, with a beneficial effect lasting beyond the intervention. We are now testing interventions to widen the social networks of patients (SCENE, £2.7m, PGfAR led by Priebe; *Br J Psych 2019*). Freestone leads a new Brain Consortium for East London Genes and Health, and a programme with Yaqoob (UoA1) which investigates inflammation and depression in renal disease (Barts Charity, £180K). Hosang (*JAMA Psych 2019*) has created an online tool adopted in social services to assess the experience of stressful life events and identify patterns of triggers for depression (ESRC, 379K).

Respiratory research (SAiii,iv) Griffiths co-leads (with Sheikh, Edinburgh) a 17-institution Asthma-UK Centre for Applied Research (AUK-CAR; Eldridge, Martineau, Mihaylova, Shaheen, Hamilton) renewed for a second 5-year term from 2019 (£2m). This UK-wide Centre focuses on the prevention of asthma attacks and reduction in asthma-related hospitalisation and death. In the

2014-2019 period, it leveraged more than £22m from the initial £2m investment. The AUK-CAR links with the MRC-AUK Asthma Mechanisms Centre, to provide a unified translational approach, from discovery science to clinical care and population health. We provided the first evidence of the extra-skeletal benefits of vitamin D supplementation in reducing the risk of respiratory infection (*BMJ 2017*), asthma attacks (*Lancet Resp 2017*) and hospitalisation (Martineau, Griffiths, Hooper, Eldridge NIHR PGfAR, £1.8m). We demonstrated that self-management reduces the risk of asthma attacks (Taylor, Griffiths *BMC Med 2017*); a multi-component education programme tailored for South Asians improves follow-up and quality of life after an attack (Griffiths, Eldridge, Taylor); poor air quality is associated with stunted lung growth in London primary school children (*Lancet Pub Health2018*); and that the London Low-Emission-Zone (LEZ) has limited impact and therefore further reductions are required (Griffiths, Grigg *Lancet Pub Health 2019)*.

Self-management and behaviour change (SAiii,iv): We are internationally recognised for our research in supported self-management of long-term conditions. Our comprehensive review of this topic for health service commissioners (PRISMS, *Health Service Delivery Research 2014*), has been downloaded more than 6,000 times, the most highly-accessed HS&DR publication ever. We have an extensive portfolio of major NIHR-funded primary care research, including multi-morbidity in airways disease (TANDEM, £1.9m, NIHR HTA, Taylor, Steed), asthma management (IMP^{2}ART, £2.5m NIHR PGfAR co-lead Taylor, Eldridge, Steed); cancer survivors (SURECAN £2.5m NIHR PGfAR co-Lead Taylor) and polypharmacy in multimorbidity (APOLLO-MM, £1.04m NIHR ClinSci award, Swinglehurst).

Smoking cessation is an important self-management activity and we lead with Hajek, an international leader on several NIHR-funded studies; nicotine replacement (NIHR £0.92m; *BMJ 2018; NEJM 2019*); relapse prevention (NIHR HTA £1.2m); role of e-cigarettes in pregnant smokers (NIHR £1.6m), and smoking cessation via community pharmacies (STOP £1.4m, NIHR PGfAR Taylor, Eldridge).

Finer (with van Heel, UoA1) co-leads the East London Genes and Health consortium (ELGH, now Genes and Health, Wellcome funding, £2.5m and £4m) which brings together expertise in genomics and population-based research. Her research spans genetics though to prevention of type 2 diabetes and encompasses new models of care. She studies the role of group clinics for young adults with diabetes in ethnically diverse, socioeconomically deprived populations (NIHR HS&DR £378k). With MRC funding (£579k, with Hull), Finer aims to harness East London population-wide electronic health record data to identify multimorbidity clusters and trajectories in British South Asians and to identify novel genetic causes and predictors of multi-morbidity (*Hum Mol Genet 2015*).

Health Data Research (SAiii,iv) The Clinical Effectiveness Group (Robson, Hull, Boomla) leads research into the effective delivery of primary care in our ethnically diverse, inner city population of East London, making use of access to individual patient records from seven clinical commissioning groups (CCGs; from three in REF2014) and population of more than 2 million. The group used patient-level data to demonstrate that multi-morbidity is the strongest predictor of emergency department attendance, which is also independently associated with social deprivation, and that low use of the GP surgery is associated with low emergency department attendance (Hull; *BJ Gen Pract 2018*). High-quality ethnicity data developed by the group as a result of close involvement with the local health community over many years, showed that the prevalence of multiple sclerosis is lower in Black and South Asian populations than Whites, but considerably higher than among Black and South Asian territorial ancestry (Boomla, Robson; *BJ Gen Pract 2017*). Trusted use of primary care data integrated with secondary care data in near

real-time through the Discovery Programme (funded by NHS England/OneLondon and Endeavour Health Charity) is enabling Robson and Dezateux to build further research capacity in actionable population health and clinical effectiveness. Queen Mary is a member of the collaborative national implementation research network (related to HDRUK, see 1a) in text analytics (£680k, Dezateux) and multi-morbidity (£1.1m, Dezateux, Robson). Eldridge and Griffiths represent Queen Mary in BREATHE, the national HDRUK Hub for Respiratory Health, established to enable research and innovation to improve the lives of people living with respiratory conditions.

We have shown the benefit of the national NHS Health Checks programme (Robson, Eldridge DoH £600k, *B J Gen Pract 2017)*; characterised lung cancer care pathways (lead Peake, PHE, Robson, CRUK, £140k); evaluated safe stewardship of antibiotics (Co-CI Robson, ESRC, £1.6m); and undertaken methodological research to evaluate the use of observational data for comparative effectiveness research (Robson, Dezateux MRC £582k).

In 2018, Robson, Dezateux and Griffiths were awarded £2.2m from Barts Charity for the REAL-Health programme to apply big data and health data science to important issues relevant to equitable health service delivery in East London. We investigated childhood obesity, congenital disorders, respiratory health, blood pressure and medicines optimisation for cardiovascular prevention. In parallel work, we showed the efficacy of hepatitis screening targeted at high risk groups (£2m NIHR-funded HepFREE, Eldridge, Griffiths, *Lancet Gastroent 2018*), that opt-out rapid testing in general practice led to increased rates of diagnosis (and possibly early detection) of HIV; and screening for HIV in primary care can be cost-effective (Leber, Griffiths, Kerry, *Lancet HIV 2015, 2017*). With £5.7m investment from Barts Charity, we created two new professorial teams (text analytics, machine learning) (SAiii). In the context of Covid, Robson (with Hippisley-Cox and colleagues from other universities) developed a risk prediction tool for Covid-19 (*BMJ October 2020* [doi: 10.1136/bmj.m3731]).

Clinical Trials and Methodology (SAii,iii,iv) Queen Mary hosts the UK CRC-registered, NIHR-funded (since 2008; latest award £544K for 2018-2021, Eldridge) Pragmatic Clinical Trials Unit. Thirty trials and other well-designed studies led or linked to the Unit have reported in this REF period, about half cluster-randomised or stepped wedge designs. In addition to trials listed elsewhere in this submission (*Lancet Respir Med 2014; PLos Med 2015; Thorax 2015; Lancet HIV 2015,2017; BMJ 2017)*, we have tested the effectiveness of treatments for faecal incontinence (*Lancet 2015*, Eldridge); interventions to support physical activity in older adults (*PLos Med 2017*, Kerry) and interventions to address infertility (*Lancet 2019*, Hooper).

In this period, we published over 90 methodological papers. A CONSORT statement for pilot and feasibility trials *(BMJ 2016)* and a paper on the definitions of these studies (Eldridge) have accrued >1400 citations and influenced funder guidance (see section-1c). Eldridge led the adaptation of the Cochrane risk of bias tool for cluster randomised trials, and is part of an international collaboration to develop a framework for the ethical design and conduct of pragmatic trials ($780K Canadian Institutes of Health Research, Chief Investigator; Taljaard). Hooper introduced a new efficient trial design (*IJE 2014*) and provided guidance on analyses of cluster randomised trials (*BMJ 2018).* His senior fellowship with The Healthcare Improvement Studies Institute (THIS) in 2018, enabled an understanding of the relationship between observational interrupted time series and randomised stepped wedge designs. Joining post-REF2014, Relton brings leadership in trials-within-cohorts/registries and public health trials such as incentives for breastfeeding *(JAMA Pediatrics 2018).* Relton's recent £2.1m award (Fresh Street, NIHR Public Health Research, with Mihaylova, Taylor, Griffiths) evaluates the efficacy of vouchers to promote healthy diets. Mihaylova, Feng, Tomini bring health economic leadership. They provided estimates of the healthcare costs of excess weight, emphasising the need for investment (*Lancet Public Health*

2017) and have demonstrated the cost-effectiveness of Simvastatin plus Ezetimibe for cardiovascular prevention in chronic kidney disease (*Am J Kid Dis 2017*). Building on this work, Mihaylova secured £558K from NIHR HTA to provide a detailed Individual Patient Data meta-analysis assessment of the clinical effects of statins and their value for money. We are evaluating the effectiveness and value of prescribed specialised services commissioning for quality and innovation (CQUIN) interventions (NIHR £496K, Feng, *BMC Med 2016*). The methodological strengths of the group led to its inclusion in the UK-wide Trials Methodology Research Platform (lead, Williamson, Liverpool) that replaced the MRC Trials Methodology Research Hub

Global Health (SAi,ii,iii,iv) Our global health research portfolio has grown substantially with several large awards and high-quality outputs. In the overlapping mental health section, we describe the NIHR Global Health Research Group which has recently been awarded (£2.8m MRC) to explore building resilience in adolescent depression and anxiety in urban Latin America (Priebe, Bird) with partners in Bogotá, Buenos Aires and Lima (plus KCL and UCL).

Prendergast leads a team that combines mechanistic laboratory work with large-scale public health trials of HIV and malnutrition in sub-Saharan Africa. The REALITY trial in four African countries showed that antimicrobial co-therapy reduced mortality by 27% among HIV-positive adults and older children with advanced immunosuppression (*NEJM 2017*). Current work aims to define the mechanisms through which this intervention operates (MRC £990K, Prendergast). The Sanitation Hygiene Infant Nutrition Efficacy (SHINE) trial (Gates Foundation, $16.6M to Zvitambo Institute for Maternal and Child Health Research, Zimbabwe; Director Prendergast) showed that better early-years feeding improved growth in rural Zimbabwe, whereas improved water, sanitation and hygiene had no effect (Prendergast, *Lancet Global Health 2019*). Sub-studies of SHINE have led to the award of three Wellcome Clinical Training Fellowships (more than £1.1m, supervisor Prendergast) to investigate growth in HIV-exposed infants, the impact of sanitation and hygiene on oral vaccine responses, and the long-term impact of early-life nutrition interventions. SHINE directly informed the Child Health, Agriculture and Integrated Nutrition (CHAIN) trial (BBSRC £1.8m, Prendergast), to improve childhood growth by improving infant diets through food supplements and agriculture. The Health Outcomes, Pathogenesis and Epidemiology of Severe Acute Malnutrition (HOPE-SAM) cohort of >700 children with severe acute malnutrition, established in Zimbabwe and Zambia (MRC £835K, Prendergast), evaluates pathogenic pathways underlying malnutrition. This has led to several early-career researchers joining the group (e.g. Bourke, Sir Henry Dale Fellowship, £1.16m; UoA1). The Therapeutic Approaches to Malnutrition Enteropathy (TAME) trial (MRC £632K, Prendergast) investigates four gut-focused interventions to reduce the high mortality among children hospitalised with complicated malnutrition in sub-Saharan Africa.

Macgregor and He are pursuing an ambitious programme of work to reduce cardiovascular disease and prevent obesity and type 2 diabetes through reductions in dietary salt and sugar (see Impact Case Studies) (*Lancet 2014, Lancet Diab Endo 2016*). They have been awarded an NIHR Global Health Research Unit (£6.6m) to reduce salt consumption in China which complements their educational MRC-funded programme (£2.5m). They are working to reduce salt intake in Malaysia (£710K MRC and Resolve to Save Lives). They demonstrated that an incremental reduction in free sugars added to sugar-sweetened drinks (without the use of artificial sweeteners) would reduce obesity in the UK in over one million people across 2 decades and prevent around 300,000 cases of type 2 diabetes (MacGregor, He; *Lancet Diab Endo 2016*).

Their 2020 Consensus Action on Salt, Sugar and Health (CASSH) highlighted the role of the food industry in the outcome of Covid-19 infection (*BMJ 2020*). Following a report on poor government

progress, the group exposed junk food advertisers who were deliberately targeting children during the lockdown and called for a national strategy to treat and prevent obesity in the most deprived areas. CASSH demonstrated that food companies continue to produce and market unhealthy food with misleading labelling. As a consequence, the Government released a comprehensive obesity strategy in July 2020.

Women's Health (SAi) This group was developed by Khan and Thangaratinam. They established the Katherine Twining Network to promote public participation and, in 2017, launched the Bart's Research Centre for Women's Health (BARC) with £2m from Barts Charity. The aim of BARC was to improve the health of women and unborn babies, leading in 2018 to a WHO Collaborating Centre for Research and Evidence synthesis in Women's Health. In May 2019, we recruited Iliodromiti (SAii) who now leads the group. Her research on large data sets demonstrated that low Apgar score at 5 min is strongly associated with the risk of neonatal and infant death (*Lancet 2014).* She showed that closer surveillance or earlier delivery of fetuses with a predicted birth weight ≤25th or ≥85th centile may reduce adverse outcomes *(PLoS Med 2017)*. The group has run a number of large randomised controlled trials. For example, EMPIRE I (Eldridge NIHR, HTA £1.5m) showed that regular monitoring of anti-epileptic drug levels in pregnancy does not improve seizure control or pregnancy outcome (*HTA 2018*). SALVO (NIHR HTA £1.8m, Hooper), a randomised controlled trial of intra-operative cell savage to reduce the necessity of donor blood transfusion in women undergoing caesarean section in 22 large maternity units across the UK, did not support the use of routine cell salvage (*PLoS Med 2017*).

1C. Development of Impact Cases with acquisition of evidence

In REF2014 our strategic aims in relation to impact were to:

Impact Aim-1. Widen user representation (from patients, carers, front-line clinicians, policymakers and industry) through all stages of the research life cycle.
Impact Aim-2. Develop additional collaborative links for applied research with local trusts, general practice, Clinical Commissioning Groups, and specialist services (e.g. smoking cessation).
Impact Aim-3. Continue extensive representation on national policymaking groups (e.g. National Institute for Health and Care Excellence, Public Health Interventions Advisory Committee and NHS England) to drive our findings into policy.
Impact Aim-4. Work with Queen Mary Centre for Public Engagement to disseminate our research to the public via mass and social media.

Here we give examples of the ways we have addressed these strategic aims and the resulting impact.

Embedding impact in the research process (Impact aims 1,2,4).

For the majority of our research projects, geographically strategic partnerships are key to ensuring impact is embedded in the research process. For example:

(i) In our mental health work, involvement with Health Partnerships London (a collaboration between CCGs, Health Education England, NHS England, NHS Digital, NHS Improvement, Trusts and providers, the Greater London Authority, the Mayor of London, Public Health England, London Councils) enables research to be discussed and the implementation of findings to be adopted across London. We have good links with East London CCGs and the Integrated

Care Partnership. At a national level, our work contributes to NICE guidelines leading to national adoption. This strategy influenced the impact of the DIALOG+ intervention (*Psychotherapy Psychosomatics 2015*) developed by Priebe, which is undergoing implementation across the NHS. DIALOG patient ratings are now recommended for the evaluation of care in all early intervention teams in England (18,642 patients as of October 2020 [NHS Digital]). Locally, it is now mandatory for all patients using London secondary mental health services (more than 100,000 patients since roll out) to be supported by an implementation management group. The intervention has been translated to more than 17 languages, and implemented and tested in over 18 countries (funded from multiple sources including EU, MRC and NIHR).

(ii) Hajek investigates nicotine substitution in tobacco dependency. His research into the safety and effects of electronic cigarettes contributed to NICE guidance on harm reduction, parliamentary debates and ultimately to UK regulation of electronic cigarettes. The work enabled the UK-stop-smoking services to incorporate electronic cigarettes and contributed to the PHE inclusion of them in the latest national Stoptober campaign. Our activities are a key influence on electronic cigarette research and regulation globally.

(iii) The Clinical Effectiveness Group has been a leader in supporting quality improvement through close working with NHS CCG's for over 30 years. Research described in this submission has enabled substantial improvements in local primary care through locally relevant guidelines, in-practice facilitation, clinical tools, clinical templates and health informatics for commissioning and clinical management. The clinical outcome indicators have been improved from some of the worst in the country to some of the best in this area of high healthcare need. Examples are:

- City & Hackney and Tower Hamlets CCGs is now top or second in the UK in 18 out of 65 national clinical quality indicators;
- Measures have been implemented in local CCGs to enable earlier detection of atrial fibrillation to prevent stroke;
- An increase in statin prescribing from 30% to 60% in individuals with known cardiovascular disease in East London CCGs;
- Inappropriate antibiotic prescribing has been reduced by 45%.

In collaboration with UCL Partners, the group provided a set of risk stratification searches which are now used across London. The original QRisk cardiovascular disease score (Robson, with Hippisley-Cox) was implemented nationally in 2013 and is used in the NHS Health Check programme, with over 2 million checks completed annually. It was endorsed by NICE in 2014. Economic modelling has indicated that the programme saved the NHS about £57m pa after 4 years, rising to £176m pa after 15 years.

(iv) Our involvement in the CLAHRC (North Thames) has facilitated funding for the implementation of a HIV screening intervention which was tested in a cluster-randomised trial (Griffiths, Kerry). This improved detection in areas of high prevalence across London (*Lancet HIV 2015*).

(v) The Health Research Board Ireland adopted the definitions of pilot and feasibility studies proposed by Eldridge 2016 (BMJ 2016), and NIHR have changed (Feb 2021) funding guidance in line with this work.

SMD-level profile raising and training (impact aim-4)**.**

The SMD has a dedicated team of Impact officers and managers led by the Deputy Dean for Research Impact (Taylor). She is supported by the Queen Mary Research Impact team, as detailed in the REF5a institutional environment. Our strategies to maximise research impact include well publicised novel community engagement facilities which engage the public and raise the profile of impact. Examples are the award-winning Centre for the Cell (eg highlighting research on asthma and air quality, Grigg, Griffiths), Barts Pathology Museum and the annual Festival of Communities. The latter engages the local population with research, for example our polypharmacy, multi-morbidity and cancer survivorship projects have been presented at these events (Swinglehurst, Taylor).

The Queen Mary Impact team provides training sessions for staff and PhD students across the SMD with excellent attendance. The training sessions range from the broad and introductory to more specifically tailored workshops regarding particular areas of impact, such as planning and writing funding applications. The Impact team also provide bespoke, one-to-one sessions where academics can discuss specific details of impact with an Impact Officer.

Developing and Promoting Policy Impact through dissemination, networks and links to key bodies (impact aim-4).

A WHO Health Evidence Network Review and a technical guidance for European Governments (Priebe) provided recommendations on mental health promotion and mental health care for refugees and other migrants. Through the COFI project (Priebe), one of the most frequently and fiercely debated subjects in mental health care was answered: It does not make a difference in the long-term whether patients have the same or different psychiatrists for in- and out-patient care but continuity of care leads to higher in-patient satisfaction. This work has been disseminated at national and international events and informed policy debates in different countries.

Mihaylova's work on statins strengthens evidence of benefits of statin therapy in women (*Lancet 2015*), chronic kidney disease (*Lancet Diab Endo 2016*), and older people (*Lancet 2019*). This work contributed to the updated European Society of Cardiology Dyslipidaemia Guidelines (*Eur Heart Journal 2019*).

Building impact into our existing research strengths in Global Health and inequalities (impact aim-3,4).

MacGregor and He have implemented an educational programme for primary school children to lower salt intake in children and their families (*BMJ2015*). The programme is now being scaled up to larger populations in diverse settings such as China. Their NIHR Global Health Unit in China has developed and implemented a comprehensive, effective and sustainable national salt reduction programme. In the UK, through a combination of public relations, public affairs and campaigning, they achieved policy impact for their research which led to recommendations to develop a Childhood Obesity Plan (2016), calorie-reduction targets and a new set of salt reduction targets (2020).

Martineau is recognised for his work on Vitamin D. He has increased testing for, and correction of, vitamin D deficiency in patients with tuberculosis, asthma, Chronic Obstructive Pulmonary Disease (COPD) and those at risk of acute respiratory infections. Many guidelines for TB treatment

now advocate correction of vitamin D deficiency. Outputs from the Analysis of Vitamin D trials (AVID) consortium led by Martineau have boosted vitamin D sales by 70% in the UK.

During the Covid pandemic, Martineau set up a longitudinal cohort study of 17,500 volunteers (CovidENCE UK) and a study of 5,440 volunteers to prevent Covid (CORONAVIT). Over £250K of philanthropic funds were raised in 2020 for the CORONAVIT trial.

Since 2008, Griffiths and Grigg have evaluated the impact of the London Low Emission Zone (LEZ) on the respiratory health of young children. This research, initially funded by Hackney Primary Care Trust and subsequently by NIHR, analysed the impact of air pollution on 2164 school children between the ages of 8 and 9 years from 28 primary schools across the London boroughs of Tower Hamlets, Hackney, Greenwich and the City of London (all areas failing to meet current EU nitrogen dioxide limits). The research team monitored children's health and growth over six years, the period over which the LEZ had been implemented. The findings demonstrated that emissions from diesel vehicles stunted the growth of children's lungs. This had potential knock-on effects on their health in adulthood, putting them at risk of lung disease in later life and a shortened life expectancy. The findings were publicised globally, featuring on UK and European television (BBC Victoria Derbyshire; France Channel 5; Chinese State Television) reaching audiences in excess of 1 billion.

During the Covid pandemic, Grigg showed that fossil-fuel derived particulate matter deregulates the SARS-Cov-2 entry receptor Angiotensin Converting Enzyme -2 in upper and lower airway cells. The data were presented to the UK All Party Parliamentary Group on Air Pollution and referenced in their publication 'air quality to reduce coronavirus infection'.

1D. Future strategic aims and goals for research and impact

UoA2 research is a major pillar of SMD research. Post-REF2021, our strategy will be to enhance multi-disciplinary research to tackle health inequalities in order to deliver better and equitable healthcare for all.

We will develop new areas of research building on current strengths to involve all institutes and faculties across the University. Our focussed areas of development will (i) environment and health, (ii) lifelong health (multimorbidity), (iii) digital health and health data science, and (iv) crisis prevention and management. Genomics is described in UoA1.

Examples of how our work fits with the new areas are provided below.

Environment and health: Through the Asthma-UK Centre for Applied Research, we will seek to prevent asthma attacks through personalised treatment. We will optimise management through self-management and care, clinical management, organisation of care, and addressing modifiable risk factors.

We intend to develop an MRC centre for our global health research. Our work on malnutrition and HIV in sub-Saharan Africa will continue, incorporating translational and clinical work on hepatitis C (UoA1). Work on the gut-brain axis in neurodegeneration (Parkinson's), pesticides and neurodegenerative diseases will expand. Longitudinal and biobank studies will maximise the synergies between different strands of our global health research. We will continue to expand salt and sugar reduction models to other countries, for example, Malaysia and the Eastern Mediterranean region, working with WHO to develop simple guidance.

Lifelong Health: This will include self-management and behaviour change in long-term conditions. We will expand our portfolio and focus on multi-morbidity, polypharmacy and psychological problems associated with common long-term conditions by conducting social science enquiry, pragmatic trials and implementation studies to improve the health of local, national and global populations. Activity in social and community psychiatry will be expanded by establishing a Centre for Depression and Anxiety Research. Priebe and colleagues have been awarded £3.2m to pump-prime this initiative. The funding will support two senior lecturers and infrastructure staff to deliver a major research programme. We are planning that the Centre, along with the two ongoing NIHR programme grants for applied research and the new MRC Programme grant for related research in Latin America, will provide the basis for a bid for an MRC Centre of Excellence. At the same time, we will further develop an inflammation and psychiatry research theme, progressing the work on mental health with East London Genes and Health, as well as our work on comorbidities and integrated care models, practice and policy. The preventive neurology group (see UoA1) will develop a cross-Institute Preventive Brain Health Sciences Group. Mental and social mental health will be prominent in the crisis prevention and management as well as the lifelong health areas of development. Investment in Lifelong Health is consistent with the ambition of Barts Health to develop a beacon academic hospital focussing in this area at Whipps Cross.

Digital health and health data science: Our precision medicine roadmap, developed as part of the Barts Life Sciences Initiative (Deloukas, Dezateux, Chelala, Jensen) will continue to develop actionable insights using digital innovations focusing on adult long-term conditions and reducing inequalities in child health (including immunisation and child obesity) in our multi-ethnic population. Currently, we are the only London site with a digital health programme to progress to the second round of a UKRI strength-in-places bid (£21m). Our vision is to secure major funding for place and household-based analyses of electronic health records using inter-sectoral data linked by Unique Property Reference Numbers (Dezateux, Robson).

In Women's health, we will enhance relationships with local CCGs and primary care to improve the diabetes prevention programme (Finer). Collaboration with the Genes and Health consortium will enable research on cholestasis in pregnancy (the South Asian population has a two-fold risk compared to the White UK population). Iliodromiti collaborates with Canadian colleagues to use artificial intelligence in preeclampsia and predict chronic hypertension in pregnant women. This links primary and secondary health data. She is also developing a pregnancy cohort based on our Antenatal Screening Service (where she has been appointed Director).

Crisis Prevention and Management: We will build on our strengths across the University to expand our expertise in this area. We have a trauma centre at Barts NHS Trust and have developed collaborative expertise in scientific and clinical aspects related to knife crime, trauma and prehospital care (UoA1). Mental health research will figure highly in this Centre, though crises will include but not be limited to healthcare, thereby including all other faculties across Queen Mary.

Translation to improve Healthcare: Although not a themed are of development, we will enhance our ability to test and implement findings through clinical trials. The Centre for Clinical Trials and Methodology was established within IPHS in 2019, based on extensive research on advancing methods for evaluating interventions in primary care, public health and health services research. The centre will continue to develop innovative designs, having been at the forefront of work in cluster randomised trials, stepped wedge designs and pragmatic trials for more than a decade (Eldridge, Kerry, Hooper). We will build on our pilot and feasibility studies and trials-within-cohorts and registries, particularly in relation to learning health systems. We will also establish a Health

Data and Evaluation group, dovetailing with the themes above. Our health economics group will undertake research that builds on existing interest in generic health outcomes for health economic analyses.

Wolfson Institute for Population Health: In order to deliver our new strategy, we will also merge the Wolfson Institute for Preventative Medicine with the Institute of Population Health Sciences (Quarter 3, 2021) under the leadership of a new director (Walter; start April 2021) and an investment of £1.2m. This will enable the new institute to focus on prevention, public health, primary care and health services research. We will have centres for preventive medicine and screening, primary care, clinical trials, health economics and, global and public health.

2. PEOPLE

2A. Staffing strategy and staff development

The SMD has held a Silver Athena Swan award since 2017 and the University promotes equality of opportunity for all staff. The university provides a collegial environment with excellent opportunities for personal and academic advancement (see REF5a). We support early career researchers via grant-writing clinics, fellowship application mentoring and mock-interviews from experienced staff. The Barts Academy acts a forum for mentorship, away-days, training events and peer-to-peer interaction.

Staff working in primary care, public health, global health and population health, benefit from the NIHR Research-Design-Service London which offers expert, free, confidential support to clinicians, health and social care professionals and academics to develop fellowship proposals and grant applications.

Annual academic promotion rounds consider applicants on merit and evaluate their contribution to research, education and research culture. The SMD offers promotions workshops, including women's promotions workshops, which inform staff on promotion requirements. In 2020, 3 female and 2 male staff were promoted from UoA2.

2B. Staff and students

A total of **34.75** FTEs are returned in this submission with a headcount of **42** research active staff. This is an increase of more than 100% (+70% FTEs) since REF2014.

Doctoral students. Since 2014, UoA2 staff have supervised 98 students undertaking doctorates of whom 59 are ongoing and 39 completed (all within 4 years). Of the 39 students who have been examined to date, all have been successful. The majority of doctoral students (76%) are full time. Funding of doctoral students included: Barts Charity (5); Asthma-UK Centre for Applied Research (5); NIHR CLAHRC (4); ESRC Doctoral Training Programme (4); East London Foundation Trust (3); MRC (3), the European Union, Spanish Government, Wellcome Trust, WHO and The Willoughby Trust. In Mental Health, we host the Health and Psychology Theme of the ESRC London Inter-disciplinary Social Science Doctoral Training Partnership and the Health Psychology Doctoral Training Pathway (with KCL and Imperial).

Clinical Academics: Lecturers, Fellows and Academic Foundation Year trainees. Since 2014, we have trained 13 NIHR Academic Clinical Lecturers, six of whom are currently in post. The seven who have completed have remained in academic posts and have been awarded a wide

range of grants and fellowships (including an NIHR Clinician Scientist award, two Academy of Medical Sciences Clinical Lecturer Starter Grants, funding from NIHR HS&DR, CLARHC and Charities). They have published high quality peer-reviewed journal articles, including in The Lancet and BMJ. Our Clinical Trainees been appointed to a wide range of leadership positions, including a Senior Founding Fellowship from the Faculty of Medical Leadership and Management and a Royal College of General Practitioners Clinical Champion for Domestic Violence.

We have hosted 25 NIHR-funded, or NIHR-badged ACF's of which 12 are currently in post. Of the 13 who have completed, half secured competitive external fellowships to continue their academic careers and a further two have been awarded consultant posts where they remain research active. In addition to many high impact publications, they have received a range of prestigious prizes and leadership positions, including the RSM Brooker Prize in Epidemiology, finalist for the 2018 Asian Women of Achievement Awards, and a Baylor College of Medicine Centre for Space Medicine Training scholarship.

New Academic Posts since 2014. As part of SMD's commitment to research in Primary Care and Public Health, senior academics were recruited to complement current expertise. Mihaylova (Professor of Health Economics) was recruited in 2018 to establish a research team in health economics and health policy analyses, with a focus on cost-effectiveness, evidence synthesis, heterogeneity in cost-effectiveness and statistical and epidemiological methods. Dezateux (Professor of Clinical Epidemiology and Health Data Science, recruited in 2017) has led our work on health data research, with an instrumental contribution to the HDR UK London Centre. Sheldon (Professor of Health Services Research; recruited in 2020; *BMJ 2016; Lancet Diab Endo 2015*) is co-director of the MRC Prevention Research Partnership Consortium focussing on reducing health inequalities in Tower Hamlets and Bradford. In 2020, Zenner (Clinical Senior Lecturer; *Lancet 2016; Lancet Infect Dis 2019*), dually accredited in public health and primary care, brought expertise in tuberculosis, HIV and migration health. In 2019, a large recruitment drive within SMD brought 15 new ECRs with fixed term 3-year Lectureships, including Joliffe (*Eur Resp J 2019; Am J Resp Dis 2020*), consolidated from post-doctoral appointment, and Tiwari (*Science Transl Med 2018*), recruited from New Delhi, both working on tuberculosis. An example of promotion of internal talent is Finer, a diabetologist working in primary care, who progressed from post-doctoral researcher to Senior Lecturer in 2016. Iliodromiti was appointed as Clinical Senior Lecturer. She was awarded a THIS fellowship to study immunological response and long-term maternal morbidity in Covid in pregnancy (£180K; 2020).

In addition to external recruitment, we have promoted internal staff leading to two new research chairs. Hooper (THIS Fellow 2018) was promoted to a Chair in Medical Statistics. Swinglehurst was awarded a 5-year NIHR Clinician Scientist post in 2016 and promoted to Professor of Primary Care in 2018. He and Bird were promoted to chairs in 2018 and 2020 respectively.

2C. Support, training and supervision of Post Graduate Research (PGR) students

PGR student progression is supported by the SMD Code of Practice for PGR Programmes. This reflects the UKRI and the Vitae Concordat principles whereby all students are expected to submit their thesis within 48 months of enrolment. Within UoA2 we had completion rates of 88% and 95% for the 2014-2015 and 2015-2016 PGR intake cohorts, respectively.

All supervisors undergo training every two years and are fully aware of the services available to support students. For continuity, progression is monitored by the same independent academic panel at 9,18 and 30 months. Supervision and assessments are captured on the university online system (MySIS) and oversight taken by the Director of Graduate Studies. Progression milestones

require the student to log at least 10 supervisions/year and to report their transferable skills training (70 hr/year), a process also captured online by the Doctoral College. Students are required to attend induction days, the GradFest event plus 31 other networking events organised by the Doctoral College. There are various opportunities for PGR students to engage in teaching and to join outreach programmes in the local community.

The SMD provides an excellent research culture to prepare students for future employment. The success of this is mirrored in the bi-annual national Postgraduate Research Environment Survey (PRES) with an overall satisfaction of 85.8% and 80.7% for 2017 and 2019, respectively. This is higher than benchmark in many areas, including research skills training and professional development. We are putting in resource to ensure that we are in the top quartile for all parameters assessed in PRES.

2D. Equality, diversity and inclusion

Queen Mary is one of the most ethnically diverse, research-led universities. Equality, diversity and inclusion (EDI) are key principles for the University (see REF5a). Unconscious bias and active bystander training have been recently updated and are mandatory for all staff. As detailed in the Institutional statement, mentoring and leadership schemes for female and BAME staff have been developed. We also support flexible working and individuals taking career breaks. We have developed specific support for childcare costs such as funding for out of town conferences (pre- and post-Covid only) through the *SMD Travel Grant for PhD students and Postdocs*. Childcare costs for students are supported through the *Financial Assistance Fund*, usually in the form of a non-repayable grant. A Welfare Advisor is available to provide tailored information. A parents and carers network has been established in response to lockdown to provide support and a sense of community.

In 2018, a new structure and reporting line for EDI was established, and in 2019 a VP for People, Culture and Inclusion appointed (REF5a). An EDI Committee supported by 2 FTE from professional services (lead Eldridge) takes oversight of all EDI matters across SMD. The SMD group led the following initiatives: an action plan following the killing of George Floyd; establishing an external speaker series to raise the profile of EDI and individuals with protected characteristics within the university community; producing a well-read monthly newsletter containing links to further reading and resources; a research project on attainment gap between BAME and non-BAME students; signing up to the BMA Charter for medical schools to prevent and address racial harassment; and, recommendations for greater transparency in the membership and terms of boards and committees. This has been agreed by the SMD executive committee and recommended by the University EDI committee for appropriate adaptation and adoption. The group also played a leading part in the inclusion of citizenship as a promotion criterion and in developing a Queen Mary group focusing on gaining a Race Equality Charter. We proactively worked on embedding EDI into all meeting structures, forums, policies and procedures within each institute. These initiatives build on our Athena SWAN successes: we received an Athena Swan Silver in 2014 and 2017. SMD funded three members of staff to attend Stonewall training who act as diversity champions including highlighting the 'QMOut' LGBTQ+ network.

We have an impressive and longstanding record of gender balance. 38% of our research-intensive professors in this unit of assessment are female, compared with 23% across the Russell Group. Over 70% of research-intensive staff at reader, senior lecturer and lecturer level are female. The percentages of BAME staff are 11% and 13% at senior lecturer and lecturer levels respectively and we are working to further improve these proportions. We believe that one of the best ways to further improve is through role-modelling and attention to the detail of gender and race balance,

for example, in committee composition and representation in senior roles. For 10 years between 2007 and 2017, Eldridge (female, statistician) and Griffiths (male, GP) shared the leadership of the Centre for Primary Care and Public Health, which is the backbone of the IPHS. We believe this model of shared leadership has been important in making our values visible. Further, our work on boards and committees has enabled us to set ambitious targets of at least 50% female and 25% BAME by August 2022 and we have developed an implementation plan to achieve these targets. A University-wide promotions review aims to increase diversity (REF5a). Of the research-focused staff internally promoted between 2014 and 2020 from UoA2, 66% were female.

A key objective of our strategy is to educate an increasing number PhD students. We recognise that, in addition to academic excellence, the research culture needs to be inclusive. There is a strict policy of zero tolerance to bullying and relevant training is provided for supervisors. In future, we will enable EU and International students to apply for UKRI funded positions, which will be offered at the UKRI fee level (£4,500) for 30% of students.

3. INCOME, INFRASTRUCTURE AND FACILITIES

3A. Research income

Over the REF2021 period until July 2020, we were awarded around £100m with a spend of £69.5m. This equates to an average of £9.9m per year compared to £5.5m during the REF2014 period. Income during the seven years was £2m/FTE and £286K/FTE/year. The main funder remained NIHR with £24.2m of research spend (35%). Other government bodies, local authorities, health and hospital authorities provided £21.1m (30%) of research income. UKRI funded £7.5m (10.8%).

We had major awards from NIHR for a Global Health Unit and two Groups. We received funding for large randomised control trials from NIHR, MRC and BBSRC. Global health research was awarded two MRC programme grants. During the REF period, the Pragmatic Clinical Trials Unit was reaccredited (2017). The unit now has a portfolio of between 35 and 45 studies at any time. NIHR funding remained constant during this period (currently £136K per annum until April 2022).

3B. Infrastructure and facilities

Since REF2014, over £25m new capital has been invested in research buildings and facilities. The University invested £11.7m in a wide range of projects to improve our facilities and we secured £14.4m through competitive proposals to external funders. These include MRC, Wellcome Trust, HEFCE (now Office for Students) and Barts Charity, together with a number of smaller Trusts and foundations. A major programme of refurbishment has been undertaken in the Abernethy Building at Whitechapel (location of the Health Data Science and Genes and Health teams). In close vicinity, Queen Mary acquired Empire House and established a University wide Digital Environment Research Institute, which synergises with our health data science by bringing expertise in artificial intelligence and machine learning. The University has also invested £850k to enhance the SMD data safe haven to ensure compliance with NHS Digital data governance requirements for patient-identifiable data. This facility is key to our clinically-focused work in UoA2.

3C. Promoting research integrity

To support an environment where auditing other researchers' data is regarded as a normal part of the research process, we appointed Professor Grigg in 2019 as Deputy Dean for Research Integrity. He provides mentorship for senior researchers and advice on integrity training including the use of the educational resources of UK's Research Integrity Office. The SMD research integrity website provides links to protocols and the UUK Concordat, a blog by Prof Grigg, and contact

details for specific enquiries. Our clinical trial transparency is very good with 94% of our European Union Clinical Trials Registered (EUCTR) studies reported in 2019 (EU Trials Tracker). We have developed a publicly-available Research Information Management System (Elements/QM publists). This provides the infrastructure for researchers to upload research data supporting their published studies where possible and in compliance with data protection regulations. We are committed to developing an audit and reproducibility culture for both clinical and non-clinical research and to uphold the Hong Kong principals for assessing researchers, thereby fostering integrity. Seminar series are delivered by Grigg for PhD students (3 times per year; in association with the faculty Deputy Dean for Post-Graduate Research) and there is a research integrity workshop for senior academics (twice per year, alternate on our two campuses).

4. COLLABORATION AND CONTRIBUTION TO THE RESEARCH BASE, ECONOMY AND SOCIETY

We have an ethos of collaboration and contribute to the research base, economy and society. One example, is the way we have led (through the Pragmatic Clinical Trials Unit) the development of data sharing policies and practices within SMD https://www.qmul.ac.uk/pctu/collaborate-with-us/data-sharing/. Other examples are that Robson published Covid dashboards (updated daily) to support public health and primary care monitoring. They identified priority groups for shielding, flu and Covid vaccinations in 2.2 million patients across north east London. Robson, Dezateux and Boomla provided data and maps to support GOLD command in London and beyond. The data has been used to inform healthcare provision, identify trends and model scenarios.

4A. Research collaborations

A large number of collaborations with academic, commercial and third-sector institutions are led or developed by UoA2 staff, too many to report here. Below we focus on the ones with broader reach and research impact where our staff have played a leading part.

Mental health research: The COFI study is the largest prospective study of psychiatric in-patients ever conducted in Europe. It involves the European network of social psychiatry researchers including those at the University of Verona. Priebe leads the multi-disciplinary Social Psychiatry Group for post-doctoral researchers covering all of the London universities. Carr leads the Alliance for Recovery Research in Music Therapy (Universities of Limerick, Bergen and Melbourne) and has built a network of music therapy researchers with a focus upon recovery in mental health. They produced a position paper (Voices, 2018) and programme of research. The Unit has formal collaborations with organisations in Bosnia, Kosovo, Republic of North Macedonia, Montenegro, and Serbia through the EC funded IMPULSE project. Our staff work closely with charities, community agencies and NGOs. We host Careif, an international mental health charity (2004-2019), and work with honorary appointments in East London NHS Foundation Trust, Barts Health NHS Trust, and Public Health England. We are affiliated with the WHO Violence Prevention Alliance and have a strong public engagement presence, e.g. our research won the Guardian's Young Radicals 2018 Award.

Respiratory research: The 17-institution Asthma-UK Centre for Applied Research, co-led by Griffiths, has achieved impressive results since its inception in 2014 (details in 1B). Griffiths leads the CHILL international research programme on air pollution, involving the MRC Epidemiology Unit (Cambridge University), MRC-Public Health England Centre for Environment & Health (Edinburgh University), the University of Southern California and University of Bedfordshire. Martineau leads the AVID consortium of approximately 30 researchers who have done

randomised trials of vitamin D in respiratory health. The consortium published four highly cited papers, all of which inform guidelines (*Eur Resp J 2019, HTA 2019, Lancet Resp Med 2017, BMJ 2017*). The group has key collaborations with the Asthma-UK Centre for Applied Research, Asthma Mechanisms Centre, HDRUK, NHS Global Digital Exemplars Optimum Patient Care, Respiratory Effectiveness Group, Primary Care Respiratory Society, Scottish Health Research Register, Cochrane Airways Group and Education for Health.

Self-management and behaviour change: We have collaborations on large NIHR grants with medical schools in Edinburgh, Kings College, Warwick, Sheffield Hallam, UCL, Oxford, Nottingham, South Bank University, Charles University Prague, Cancer Council Victoria Australia. **Hajek** is a Member of UK Centre for Tobacco and Alcohol Studies (formed by 12 universities in the UK, one in New Zealand).

Health Data research: The Clinical Effectiveness Group (funded by Clinical Commissioning Groups, GP Confederations, Public Health and research grants), part of our Health Data research work, has been supporting primary care for over 20 years and we are now working with seven CCG's in East London.

Clinical trials and methodology: Eldridge leads the international Pilot and Feasibility collaboration established in 2011 which has led to key papers and a website designed for those working on empirical pilot and feasibility studies or methodological work. We have several collaborations on cluster randomised and stepped wedge designs which have led to key papers. We have hosted an international meeting every year since 2015 (70 participants in 2019) and have a website designed for those working on empirical trials or methodology. Eldridge led the cluster randomised trials sub-group that recently revised the Cochrane Risk of Bias tool.

Global Health: Through our NIHR Unit (£6.5m, He/McGregor), NIHR Group on Mental Health (£1.9m, Priebe/Bird) and NIHR Group of Asthma Outcome in African Children (£2m, Grigg, Griffiths and Fortune [UoA3]) we have extensive productive collaborations across several countries in South America, Africa and Asia.

Women's health: We set up the pioneering Katherine Twining research network to promote participation in quality research in women's health. This network integrates one of the UK's most diverse and vibrant communities.

4B. Wider activities and contributions to the research base, economy and society

Spin out companies, commercialisation, industry, impact and media: Submitted staff have contributed to public understanding through appearances on, for example, BBC News, the Victoria Derbyshire Programme, BBC Today, Radio 3 Music Matters, BBC Radio London, BBC Asian Radio, Sky News, The Breakfast Show, as well as contributed to articles in the Guardian and Independent. Griffiths and Grigg have made several presentations of their research on air quality and the London ultra-low emission zone. Finer led public engagement in research, explaining the link between maternal sugar intake in pregnancy and childhood allergy risk, stress at work and incentives to improve breastfeeding. Eldridge has contributed to the wider research community through numerous YouTube videos on pragmatic trials. Mihaylova was involved in Perspectum Diagnostics, a spin out company which uses multi-parametric Magnetic Resonance Imaging to quantify liver tissue in the diagnosis of liver disease. Robson and Dezateux are founding members of the North-East London Discovery Data Service. This is an NHS project which united East

London's longitudinal realtime primary care, secondary care and other health related records to improve clinical outcomes.

National and international funding panels: Our staff sat on over 20 national and international funding panels. These included NIHR Health Technology Assessment (Priebe, Taylor, Eldridge), Efficacy and Mechanisms Evaluation (Grigg), Programme Grants for Applied Research (Taylor, Eldridge, Mihaylova), Advanced Fellowships (Hooper), Post-Doctoral Research Fellowships (Hooper), Research for Patient Benefit (Hooper). Sheldon sits on the Research Leader Awards review panel (2019; Health Research Board of Ireland) and, from 2018, on the Research Council of Norway. Priebe is Chair of the panel for Mental Health of Refugees Research (German Ministry for Education and Research), Clinical Trials panels (German Research Association) and the Swiss National Fund. Staff sit on the National Institute for health/National Institute on Drug Abuse panel (Hajek); International panel assessing applications to Global Research Awards for Nicotine Dependence (Hajek); Marie Curie Cancer Care (Taylor); EU Horizon 2020 Mental Health in the Workplace (Bird); German Federal Ministry of Education and Research Advisory Panel to establish a national centre on "Healthy lifelong Child and Adolescent Health" (Dezateux); Music Therapy Charity Research Committee (Carr).

Health strategy panels and Government advisory bodies: In this REF period, staff have contributed to over 30 strategic panels and initiatives. These include invited contributions to House of Commons committees (Hajek, Carr); contributions to Public Health England panels (Grigg, Carr); NHS England Renal Strategy (Hull); National Tier Four Personality Disorder Service Commissioning Panel (Freestone); Confidentiality Advisory Group of the Health Research Authority (Boomla); Office of Strategic Coordination of Health Research, Health Informatics Sub-Group (Dezateux); NIHR Strategy Committee (Carr), Health Technology Assessment Expert Advisory Group Member (Taylor) & Chronic disease self-management reports (Taylor); Wellcome Trust Advisory Group on Understanding Patient Data (Dezateux); Staff contributed to NICE Guidelines (Hajek), Royal College of Physicians influential reports (Griffiths); the Diabetes UK advisory board on health economics (Mihaylova) and British Heart Foundation UK cardiovascular data science centre (Dezateux).

We have advised overseas Governments on funding, advisory bodies and agencies: Malta, National Mental Health Strategy 2020-30 (Priebe, Taylor); WHO, European Governments (Priebe); Ireland Health Information and Quality Authority (Taylor); Belgium Health Care Knowledge Centre (Eldridge); Ministry of Health of the People's Republic of China (Hajek).

We responded to the pandemic in a number of ways. In addition to the research contribution of Martineau, McGregor and He reported above, Eldridge is a member of the UKRI/NIHR urgent public health review panel, which provides expert reviews to the board. Sheldon is a member of the Bradford Covid-19 Scientific Advisory Group (C-SAG), providing expert input to the response. He presented this work recently to the NIHR Senior investigators annual conference. Several projects on Covid are led or co-led by our staff. We contribute to the national testing programme and associated research, and established a PCR-Testing facility in the Wolfson Institute of Preventative Medicine as part of the Pan-London MedCity Covid-19 Testing Alliance (pillar 2 testing; Department of Health £3.66m). We are extending this to include Loop-mediated isothermal amplification (RT-LAMP) for saliva-based testing.

Leading positions in professional subject associations or learned societies: Chair, Royal College of Paediatrics and Child Health Working Party on the effects of indoor air pollution on children's health (Grigg); Head (elected) Paediatric Assembly, European Respiratory Society

(Grigg); Chair of Genes and Environment Group, Epidemiology Assembly, European Respiratory Society (Shaheen); Chair of Academy of Medical Sciences Steering Group, New Technologies & Patient Data, 2017-18; Chair of Academy of Medical Sciences Sectional Committee, Fellowship Panel, 2015-2018 (Dezateux); Academy of Medical Sciences work group on Data Driven Technologies (Boomla); Member of Royal Statistical Society Council 2015-2019 (Eldridge); member of the national chronic kidney disease audit in primary care team (Hull); Linguistic Ethnography Forum 2014-2017 (Swinglehurst); Founding member of Doctors against Diesel (Griffiths), Alliance for Recovery Research in Music Therapy international research consortium (Carr); Austrian Forum for Primary Care & Public Health Forum (Leber); Task Force member of 2019 European Society of Cardiology and European Atherosclerosis Society Guidelines for the management of Dyslipidaemias (Mihaylova); RCGP Cardiovascular group member (Robson), Chair of the NIHR Statistics Group Executive (Eldridge).

Editorships, awards, honours, prizes and keynote presentations: Victoria Tzortziou-Brown received an OBE in the 2020 New Year honours, for services to General Practice. Khan (left in 2019) and Eldridge became NIHR senior investigators, Martineau obtained Fellowship of the Royal Society of Biology. Swinglehurst received the prestigious RCGP/Society for Academic Primary Care John Fry Award for contribution to the discipline through research, Hooper won Journal of Clinical Epidemiology Reviewer of the year, Jovanovic won the European Annual Research Award for Early Career Psychiatrists, Hosang won the Samuell Gershon Young Investigator Award (International Society for Bipolar Disorders).