Institution: University of York

Unit of Assessment: 2 - Public Health, Health Services and Primary Care

Section 1. Unit context and structure, research and impact strategy

1a – Unit context and structure

Health research at University of York (UoY) has built on, and benefitted from, its achievements in REF 2014, not least our 100% 4* rating for research environment, which created a springboard for our success in this assessment period. In 2020 health research accounted for 26% of all UoY research income contributing to our long-standing reputation for innovative, rigorous, interdisciplinary and influential health research and exceeding the objectives outlined in the 2014 REF submission.

Substantial investment in staff and infrastructure (section 2 & 3) has almost doubled the number of staff submitted, from 52 to 92 FTE and grown research income to an average of £14.4m per year (over £101m in period). Our supportive and inclusive culture, positive environment and commitment to professional development (section 2), combined with a forward-looking strategy has enabled our health research community to thrive.

UOA 2 research is carried out principally within four applied health research departments: the Centre for Health Economics (CHE), Centre for Reviews and Dissemination (CRD) Department of Health Sciences (HS) and Hull York Medical School (HYMS). These departments span two faculties (Sciences and Social Sciences) that provide physical space and research support to facilitate cross-disciplinary working, while maintaining the core disciplinary focus of each. Across these departments, researchers from many disciplinary and professional backgrounds work together to address national and global challenges. Our research is strengthened by established research networks with longstanding national and international partners (section 3 & 4).

Implementation of our health research strategy, aligned with the UoY strategy as contextualised in the Institutional Environment Statement (IES), has created an infrastructure that builds on our disciplinary strengths and facilitates interdisciplinary research across contiguous departments. As part of our strategic approach, the University and health related departments have invested in staff, and new workspace and practices, to create a culture of interdisciplinary working that is conducive to producing innovative, impactful research. (*IES paragraphs 2-4, 8*). Our impact case studies (section 1c) highlight how our research contributes methodologically while informing policy and practice.

1b – Research strategy

Our 2014 UOA 2 strategic intent was to: *'...make a significant contribution to the level and fair distribution of population health and the safety, quality and efficiency of services through high quality research across applied health and social care'.*

Since then we have created new knowledge that has underpinned the introduction of novel healthcare interventions and systems and facilitated changes in health policy and practice, nationally and internationally (section 1c).

In this assessment period the UoY Research Strategy has been supported by new institutional structures and investment (*IES paragraphs 8 to 10*), including the establishment of seven university wide interdisciplinary research themes (*IES paragraph 4*), two of which were led by senior health researchers who facilitate novel interdisciplinary research across Health and Wellbeing (Bloor) and Justice and Equality (Pickett). UOA 2 departments' investment in research staff and networks has been instrumental in supporting the academic collaboration that underpins the policy and practice relevant research for which York is renowned. Engagement across the UOA 2 departments, with other disciplines through York departments: Biology, Environment and Geography, Psychology, Social Policy and Social Work, Sociology, Education

and externally with other HEIs and research institutes is evidenced by 90% of our UOA 2 research outputs being flagged as interdisciplinary (REF 2).

Our 2014 research plans stated that we would build on our 'thematic architecture', which we summarised in three core areas: **Health Technology Assessment, Health Policy and Public Health.** Each of these areas has subsequently grown and we have expanded global health activities across the whole research portfolio (section 1c & 4). Through developing and refining methodological approaches, as well as designing and evaluating innovative interventions, our research has demonstrated quantifiable impact in health policy and practice (see REF 3).

Health Technology Assessment (HTA)
UoY HTA is known for innovation and rigour, drawing on expertise in evidence synthesis, clinical trials and economic evaluation to produce best evidence for decision-making. Future aims in our REF2014 submission - to advance methodological development; expand the scope of our trials of complex interventions; and increase the global reach of our research methods - have been delivered and exceeded.

Our methodological research has developed and refined **the methods and processes of HTA**, informing the activities of NICE and other agencies internationally. Examples include development of population-adjusted indirect comparisons in medical decision-making (Dias, Palmer); modelling methods in advanced cancer (Palmer, Rothery, Soares, Woods); methods for the assessment of regenerative medicines and cell therapy (Palmer, Hodgson); elicitation of expert judgements to inform decision models (Bojke, Soares); methods for stratified, personalised and precision medicine (Iglesias, Manca); methods to establish the value of diagnostic and prognostic testing (Sculpher). Our methods research on **handling uncertainty to support decision-making and research prioritisation** won an international award (Bojke, Griffin, Palmer, and Rothery) and Rothery leads an International Research Task Force on these methods. More generally, we have been instrumental in the **development and application of complex methods of synthesis** such as network and IPD meta-analysis (Dias, Simmonds, Soares, Stewart) as well as qualitative synthesis and synthesis without meta-analysis (Flemming, Sowden) and living systematic reviews (Simmonds).

Our evidence syntheses cover a broad range of topics with particular strengths in **mental health** (Bojke, Churchill, Coventry, Dias, Gega, Gilbody, McMillan, Siddiqi, Wright), **neonatal care and nutrition** (McGuire); **paediatric cancer supportive care** (Morgan, Phillips) and **orthopaedics** (Hewitt, McDaid, Rangan, Torgerson). Our impact case studies demonstrate this (see REF3).

In the assessment period, UOA2 staff authored over 200 evidence syntheses, including over 60 Cochrane reviews, across a broad range of health topics (section 4). In addition to providing best evidence for decision-making, our evidence syntheses have identified research needs, and in discussion with stakeholders we have prioritised research questions, many of which have led to the development, piloting and evaluation of interventions through large-scale pragmatic trials (Churchill, Gilbody, Hewitt, McDaid, McGuire, Phillips, Torgerson and Wright).

Since 2014, York Trials Unit (YTU), a UKCRC registered clinical trials unit led by two UOA 2 professors (Torgerson and Hewitt), has completed 105 projects, including 76 randomised trials. The YTU research portfolio has expanded in scope and depth, particularly in the **evaluation of complex interventions**, as evidenced by our large-scale trials in mental health and orthopaedic surgery. In 2014 we established the British Orthopaedics Association Surgical Research Centre at York, and in 2015 YTU became a Royal College of Surgeons accredited Surgical Trials Centre and established a series of trials in orthopaedic surgery (Rangan).

We major in mental health trials coordinated through our Mental Health & Addictions Research Group (led by Gilbody) where we evaluate complex interventions across the life course including screening, psychological and behavioural interventions and innovative and scalable methods of delivering evidence-based interventions. Completed and active trials include telephone-delivered collaborative care for older people with depression (Gilbody, Macmillan), computerised CBT as a

treatment for young people (Wright) and single session treatment for children with specific phobias (Gega).

York's sustained leadership in the broader field of evaluation is evidenced by the many years that we have led/co-led Department of Health/NIHR funded policy research programmes and units in this field, including the Policy Research Unit in Economic Methods in Health and Care Interventions (EEPRU 2013-2018 and EEPRU II 2019-2023 (Sculpher) in collaboration with the University of Sheffield. Research within EEPRU has advanced methods and influenced policy, including the use of novel methods and datasets to estimate the **marginal productivity of health expenditure** in the NHS, social care and public health sectors (Sculpher). This work has also contributed to one of our impact case studies (see REF 3) and influenced PHE and DHSC policies; providing a framework for **evaluating new antimicrobials** (Palmer Rothery, Sculpher, Woods), which informed government policy for countering antimicrobial resistance and is now used by NICE in the context of new payment mechanisms for antibiotics. We have also created and hosted an extensive range of applied and policy informing clinical and economic data sets that are used for modelling and evaluation by a range of research teams and external networks. We conduct decision analytic modelling studies and economic and statistical evaluation of observational and registry and observational data sets, funded by the MRC, NIHR, NHS, EU, DfID and the charitable sector (e.g., British Heart Foundation - BHF).

Our aim to increase economic evaluation, decision modelling and policy evaluation in low and middle income countries has been realised and is epitomised by our flagship GCRF funded “Thanzi la Onse” (Health of All) programme. Through interdisciplinary working within strong partnerships between epidemiology, economics and political science, this programme generates high quality research to inform resource allocation decisions in Southern and East Africa. This led to the creation of a Health Economics Community of Practice within the East Central and Southern (EC&S) African Health Community; an intergovernmental organisation representing ministries of health and universities in nine countries (Eswatini, Kenya, Lesotho, Malawi, Mauritius, Tanzania, Uganda, Zambia and Zimbabwe).

Health Policy

UoY’s commitment to ensuring that health policy is informed by rigorous research has further strengthened since 2014 and delivered in key areas, all of which will be sustained and developed as part of our future strategy, in part through our long-established success in leading NIHR funded Policy Research programmes and units, most recently the Economics of Health Systems and Interface with Social Care - ESHCRU II, (Mason, in collaboration with LSE). These include: the **measurement of the overall performance of the healthcare systems in terms of productivity** (Castelli, Chalkley*)* which by building on our established expertise, developed methods for taking account of quality improvements in the NHS, assessed the feasibility of measuring performance at the level of individual hospitals, and applied a lens on productivity with regard to the impact of COVID-19. Research on the impact of **different methods of payment on the delivery of healthcare** (Chalkley, Doran, Goddard, Gravelle, Gutacker, Mason), has been distinctive in combining the concepts of theoretical economics applied to incentives with cutting edge empirical analysis of natural experiments in healthcare deriving from the phased or differential introduction of new payment systems, evaluating impact of *pay for performance* schemes and the effectiveness of *activity based finance,* including payment for mental health (Jacobs, Chalkley, Mason). We have **examined the role of provider ownership, market forces and competition** in shaping the efficiency and quality of healthcare, with a particular focus on patient choice (Gravelle, Gutacker).

Our health policy research has expanded to achieve other objectives from 2014. This includes **improving methods to assess the fairness of policy change and NHS financing,** which has been achieved partly through the creation of the Wellcome-funded EQUIPOL (equity in health policy) research group (Doran and Cookson 2017-2022). Our objective to explore **better methods for rapid but robust evaluation of complex interventions** has been achieved through the work of the NIHR Health Services and Delivery Research Programme Evidence Synthesis Centre (Eastwood), the NIHR Policy Research Programme (PRP) Policy Reviews

Facility (Sowden), and the NIHR PRP Fast-response Analysis Facility (Bloor). These two policy facing facilities provide timely, responsive research findings to DHSC and related organisations to inform policy developments - see details in section 3. The **development and application of methods using linked clinical and administrative datasets** to monitor health service performance has helped drive impact in policy, clinical and patient decision-making. This is evident in our impact case studies (section 1c and REF 3).

Public Health

Public health research is carried out collaboratively across departmental and disciplinary boundaries enabling us to focus on real world problems and global challenges to population health, with research on the impacts of ecological conditions such as climate change, biodiversity loss, chemical and air pollution, clean water, food and energy; and broader social determinants, including housing, social security, work and income, social relationships, human rights and social justice. In 2014 our stated aim was to: *'...use advanced epidemiological approaches, evidence synthesis and Trials Within Cohorts to investigate social and healthcare delivery factors affecting inequalities in health and the effectiveness of non-NHS interventions'.*

We achieved this by strengthening our partnerships, developing novel methods and studying complex interactions as evidenced by our work with the Bradford Institute of Health Research, co-leading the current MRC/ESRC-funded primary school-age wave of the Born in Bradford (BiB) cohort study (Pickett) to understand the factors that affect child socio-emotional wellbeing, cognition, and healthy growth.

We are a centre of excellence for methods of **public health economics** (Cookson, Griffin, Suhrcke, Bojke). Our research on distributional cost-effectiveness analysis (Cookson, Griffin, Sculpher, Walker) pioneered the development and application of new methods to integrate and quantify health inequality impacts in economic analysis of health interventions which informed NICE policies; as well as the development of health equity indicators now used routinely in the NHS (Cookson). Public health economics is also embedded in the Yorkshire and the Humber Applied Research Collaboration (ARC) and in ActEarly programmes (Bojke, Cookson, Richardson). Other methodological expertise lies in data linkage and sophisticated analysis of cohorts and administrative data (Doran, Fraser, Prady) and **evidence synthesis in public health** (Sowden).

We are at the forefront of research on **interactions between physical and mental health**: aiming to prevent a) physical ill-health of people with severe mental ill-health (Gilbody, Siddiqi N, Ratschen) and b) mental ill-health among those with longstanding, chronic conditions such as diabetes (Siddiqi N, Jacobs). This research is embedded in our Yorkshire and the Humber ARC (Gilbody) and sits alongside our developing focus on **public mental health**, in the UK (Coventry) and in South Asia (Siddiqi N). We have developed targeted smoking cessation interventions for people with severe mental ill-health (Gilbody); focused on reducing the use of smokeless tobacco in South Asian countries and South Asian populations in the UK; and developed educational interventions to encourage 'smoke free homes' in Muslim communities (Siddiqi, K).

An ambition in our previous REF submission to develop trans-disciplinary work with biological and environmental sciences has been achieved through the work of our Epidemiology and Cancer Statistics Group who work with biomedical researchers and clinical partners on haematological malignancies; research across health and the environment including the ESRC-funded Health of Populations and Ecosystems study; Wellcome-funded Lancet Countdown; Tracking Progress on Health and Climate Change; and the Leverhulme Centre for Anthropocene Biodiversity, which includes research on interrelationships between ecosystems, societal inequalities and wellbeing.

1c - Impact strategy and achievement

UoY measures research success by the difference we make and the impact we have on population health - locally, nationally and globally. In 2014, our stated objectives for impact were: *'to ensure research has high visibility nationally and internationally, and is relevant to policy makers and practitioners*.'

Our research impact strategy, appointment of departmental impact leads (Bywater, Churchill, Moreno-Serra, Wright) and implementation of research expectations have all helped achieve this objective, as have UoY initiatives to promote collaborative research and value wider societal impact, as part of positioning York as a University for the public good (*IES paragraphs 1, 4-6*). Our approach has resulted in a significant body of impactful research (see REF 3 and section 4).

All our impact case studies (ICS) align with our impact strategy in that they are based on long standing external funding and have extensive stakeholder engagement (section 4). Impact is evidenced across our core areas of research - HTA, Health Policy and Public Health - (section 1b), each of which has benefited from new staff appointments since 2014 (section 2). Examples of staff appointments that directly influenced our submitted ICS include: two research fellows (Ochalek, Woods) in 2014 who have contributed to '***Using Economics to Inform Budget Allocation in Global Health***' ICS (see REF 3); a senior academic and former NHS National Clinical Lead (Doherty) in 2014 to direct the BHF National Audit of Cardiac Rehabilitation (hosted at UoY) and lead on '***Cardiovascular prevention and rehabilitation***' (see REF 3); a Clinical Lecturer (Morgan) in 2016 who has contributed to our '***Improving management of neutropenic sepsis in paediatric cancer patients***' ICS (see REF3).

Working together, our researchers receive support to secure long-term programme funding, which has enabled us to forge and sustain long standing relationships with policy makers. Continuous funding of policy research units and programmes over more than 25 years has underpinned the production of research with substantial impact as illustrated. Over the assessment period our staff have utilised a range of methods of engagement to foster impact, including national and European professional committee memberships; advisory board roles; clinical and patient network events and meetings; regional, national and international steering group work (see REF 3 and section 4). UoY and health research infrastructure (section 3), including the York Research Impact Forum brings together researchers from across the University to share best practice and discuss issues and problems in aspects of their knowledge exchange or impact work.

We encourage PIs and ECRs to engage actively with their stakeholders and beneficiaries, and in many of our research programmes this forms a core and funded component of the award. Departmental, UoY and external schemes (e.g., UKRI Impact Acceleration Awards) have also provided funding for impact development (see REF 3) including protected time, impact leave and travel to facilitate collaborative working within the university and in partnership with national and international stakeholders and end-users (*IES paragraph 12-13*). Most of our researchers have time for pursuing impact built into their projects. When this is not possible research leave can be requested for two to three weeks to carry out collaborative work and attend external meetings that support grant applications or impact related activity.

Patient and public benefit is core to what we do and is evident in all our research groups and programmes of research through patient and public involvement and engagement (PPIE). This is embedded in our approach and often involves PPIE colleagues costed into grant applications as formal collaborators in our research. One example of PPIE in action is through our Cochrane Common Mental Disorders Group where we routinely involve patients and the public in priority-setting, co-production of protocol formation and dissemination outputs, and active peer review and co-authorship of publications, as well as engaging with them in wider PPIE opportunities (e.g., through the Cochrane Consumer Network and group webinars).

At institutional level the UoY provides financial support for PPIE through a network led by senior researchers in partnership with local and regional NHS and social care service leads (section 4).

Research integrity, data governance and ethics

Our approach to research governance and integrity (*IES paragraph 14*) is well-established, adhering to national and international standards and principles in accordance with the UK Research Integrity Office and the UUK Concordat. Our 2015 Health Research Strategy (updated in 2018) expressed our longstanding commitment to providing an infrastructure and culture to support staff and students in carrying out research underpinned by the highest level of integrity, professional conduct and governance. HR colleagues and Faculty Associate Deans for Research provide support to investigate fully (and if necessary, act upon) any possible research misconduct and any concerns about research integrity. Our working practices are reviewed and updated by UoY and relevant departmental research committees every three years; or in response to new challenges, such as the coronavirus pandemic, in respect of international and NHS based studies.

Standard operating procedures across UOA 2 Research Committees require ethical approval before any form of participant involvement or primary data collection occurs. Our ethics and research governance committee (chaired by a senior independent academic) meets every two months and comprises researchers from UOA 2 along with at least one lay member. Time for chairing or supporting research ethics/governance/data committees is recognised in workload models. This process extends to NHS Health Research Authority applications, where we have a research governance oversight role. We work closely with our principal investigators and NHS research ethics committees to provide the necessary resources to support the ethics approval processes.

Health research at York adheres to the UK Data Protection Act 2018 in accordance with General Data Protection Regulation (GDPR) requirements, and ensures that all research data are safeguarded and used only for the purpose for which it was gathered. This is monitored through our Data Governance Committee, which checks all research applications that intend to collect and store data with personal identifiers. This committee verifies data agreements with external agencies supplying York researchers with data and that departments holding NHS data meet NHS Information Governance Toolkit requirements, supported by mandatory staff training. These measures assure the public of York's compliance with information governance standards.

Open research environment

Support for open access (OA) publishing

We are committed to openness and transparency and make our research freely accessible, whenever possible. Our success in securing funding for long-term research programmes from NIHR, UKRI (e.g., MRC) and many charities for example the Charity Open Access Fund (COAF) has help provide substantial support for open access publishing. Open access funds for other research are provided by research groups and departments. UoY strategy (*IES paragraph 15*), with support from the Director of Library and Archives (who has responsibility for OA), has helped staff to move beyond compliance, by creating a culture that values and actively promotes open access. Our Research Committees and Faculty Research Groups have taken positive action to ensure that all grants factor in UKRI access, open research requirements, and adhere to UoY Policy on the publication of research. Academic staff, supported by experienced research administrators using PURE software, share operational responsibility for monitoring OA publishing and for placing research outputs in publicly accessible repositories in a timely fashion. Our ability to do this is enhanced through our White Rose University Consortium (section 2: Postgraduate Research Students).

Support for 'open data' including sharing and management of research data

Supported by the UoY Open Research Strategy Group and York's approach to open research (*IES paragraph 15*) we are committed to the long-term development of an open research culture underpinned by strong governance structures. We operate in accordance with the Concordat on Open Research Data and UoY Research Data Management Policy. In 2018 we constituted a Data Governance Committee to review data management and governance processes focusing on research consent and data use beyond the formal end of a study. UOA

2 researchers have taken proactive steps, adhering to GDPR guidance, to make their research data accessible and reproducible. Examples of open research activity include:

- Development and management of PROSPERO as an open resource, enabling researchers to register systematic reviews, and any user to access records, free of charge. Over 14,000 reviews were registered from 138 countries in 2019 (>100,000 registrations since inception in 2011); over 3,000 related to COVID-19 were registered to August 2020; there were over 2.7 million page views in 2019. Critical summaries of systematic reviews and economic evaluations are also available free of charge in archived versions of DARE and NHS EED databases.
- The Epidemiology and Cancer Statistics Group makes population-based data on disease occurrence and outcomes for haematological cancers freely available on the Haematological Malignancy Research Network website. This is the only place worldwide where accurate incidence, prevalence and survival data can be accessed and downloaded across all ages for all clinically meaningful diagnostic groups (WHO ICD-O3). Datasets from this project are also made freely available through the European Genome-Phenome Archive (Nature Genetics).
- YTU policy on open data enables researchers to access underpinning research data relating to published trials. Requests for anonymised (de-identified) patient level data are made through the corresponding author and reviewed by the trial management group.
- YTU's Trial Forge Studies Within a Trial (SWATs) Centre, is part of an international initiative providing resources, freely and openly to help improve trial efficiency. Our Centre initiative 'PROMETHEUS' is used to pump-prime clinical trial teams to include SWATs routinely.

Research objectives and activities for the next five years

Our overarching strategic aim is to act in accordance with the principles of social justice to generate research evidence that drives the necessary policy and practice change required to improve the level and equitable distribution of population health. Our objectives for the next five years are to:

- Continue to grow and enhance the research underpinning evidence-based policy and practice in health and social care and public health;
- Develop further our research evaluating the impacts of population- and system-level policies on health and health inequalities;
- Contribute to improving efficiency and equity in health provision nationally and internationally, with a particular focus on low-and middle-income countries;
- Grow our knowledge translation and mobilisation activities, extending co-production, co-creation of knowledge and engagement with citizen science;
- Inform resource allocation decisions across sectors with the purpose of improving population health and wellbeing from limited resources.

We will achieve these objectives through investing in, developing and employing novel empirical methods and cutting-edge theory, leveraging the best available data and understanding the experience of patients and the public. Our plans to further develop health research include:

- Leading and championing co-production of mental health research by working across the institution and with local, regional, national and global partners;
- Generating sustained interdisciplinary research translating fundamental science into useful clinical interventions and insights by working with the York Biomedical Research Institute and partners;
- Undertaking research to support the resilience and sustainability of global healthcare systems, in partnership with decision makers in the UK as well as in some of the world's poorest countries, which includes investigating the medium and long-term determinants of future health arising from the pandemic;
- Ensuring our research reflects a diverse range of experiences, consistent with the social and cultural make-up of the societies in which it occurs.

2. People

Staffing strategy and staff development

In the assessment period we increased category A staff from 52 to 92 FTEs (101 staff in total), which enhanced our critical mass of expertise and generated significant impact (sections 1c & 4). At the same time, we increased our average research income by £2.8m per year compared to REF 2014 (section 3). Growth was achieved through targeted recruitment and a proactive approach to staff retention; enabled through career development support, flexible working practices flexibility in the proportion of activity allocated to research, teaching and citizenship roles and opportunities for research and impact leave (with commensurate adjustment for part-time working) across all academic and research career stages. Our approach and success has contributed to a vibrant culture of interdisciplinary team working (section 1b) and regular open consultation with staff creates a transparent and positive working environment and a supportive culture.

Our approach to building our research expertise and capacity is: (1) to recruit academic and senior research staff who are (or will become) leaders in their relevant research areas; (2) to appoint and retain career researchers whose interests and skills align with our established and emerging research areas; and (3) through ongoing guidance and support, to enable them to become future research leaders.

Staff development strategy

UoY's commitment to professional development and career pathways (*IES paragraph 9*) has been recognised by two successive HR Excellence in Research awards (*IES paragraph 27*). In 2016, as part of our Researcher Development Concordat (*IES paragraphs 27 -28*), we established a Contract Researchers Forum. This brings together career researchers and PhD students to share experiences and provides training and development opportunities to help support their career progression and enhance their role. The Forum is chaired by research staff and has dedicated administrative support, coordinating quarterly meetings and organising career-focused workshops and social events. Development is also supported through the UoY's Mentoring Scheme and Research Excellence Training Team (*IES paragraph 32)*.

Strategy for academic and research appointments

Our recruitment strategies reflect those of UoY (*IES paragraph 20-21*). To build capacity and strengthen the areas of strategic development outlined in REF 2014 and expertise in emerging methodologies, we appointed 23 senior staff across UOA 2, including *two clinical academic professors*, in key areas such as: Mental Health and Addictions (Churchill, Coventry, De Oliveira, Gega, Hawkins, Madden, McCambridge, Ratschen, Taylor, *Van der Feltz-Cornelis*, *Wright*); Health Technology Assessment (Dias); Cardiovascular Health (Doherty); Global Health (Dogar, Elsey, Moreno Serra, Siddiqi N, Suhrcke; Implementation Science (Glidewell) and a senior qualitative methodologist and health sociologist (Sheard) to embed a wider sociological perspective in our clinical trials. YTU was awarded capacity funding through the Mary Kinross Trust to appoint two professors (Adamson, Rangan). We have also invested in wider public health intelligence and economic expertise (Ferguson).

Through our recruitment processes and ability to retain staff our overall staff base has grown to 101 category A staff submitted. Of these **60 (59%) are women representing a 93% increase in the number of female staff submitted** compared with REF 2014.

Departments take an active approach to career development, including through individual performance and development review and mentoring alongside the collective efforts of Departmental Management Teams, Research Group Leads, Research Committees and the Contract Researchers Forum. Criteria for promotion and the annual promotion time scales are made available through our staff webpages, staff meetings and often discussed in staff open forums. Promotion is regularly discussed at meetings with mentors and line managers.

We have successfully supported staff through promotion during the REF period. Of 93 staff that applied for promotion, 76 were successful representing an 81% success rate. Promotion outcomes (in-period) were in accordance with our Athena Swan action plan as evidenced by:

- **57 women applied and 46 were promoted**, (81% success rate). 36 men applied and 30 were promoted (83% success rate).
- **20 professorial applications (9 female, 11 male) were made, 18 (90%) were successful**
- **13 reader applications (9 female, 4 male) were made, 11 (84.6%) were successful**
- **6 women and 1 man who joined the UoY as ECRs or lecturers were promoted to professor**.
- 60 staff (39 female and 21 male) applied for promotion to lecturer/senior lecturer or a higher research grade **with an 82% success rate for women and 80% success rate for men**.
- **Of the 14 women working part-time, ten applied and all were promoted;** of the nine men working part-time, one applied and was successful (six of these men were professors in the last REF).

Integration of clinical academics

York has a longstanding commitment to providing an environment that enables collaboration with the NHS. This is further supported by clinical academic appointments including eleven more made since 2014, resulting in a total of nineteen clinical academics who lead or collaborate in research within our health research groups and have strong links to other UoY departments including Biology and Psychology. The Hull York Medical School (HYMS) is the chief facilitator of our clinical academic appointments. HYMS promotes early clinical exposure and clinician-led problem-based-learning, which is allied to a research focus on evidence synthesis; intervention development; clinical trial evaluations; and public good. This is integrated with support from CRD, CHE, HS and strong regional and national clinical networks (section 1b HTA/Trials). This partnership brings together academic and clinical multi-disciplinary researcher teams who work together to improve the lives of patients and positively influence health service delivery as evidenced through our impact case studies (see REF 3). In the REF period we have also supported three NIHR Academic Clinical Fellows and one NIHR Clinical Lecture (Section 4).

Our capacity to support clinical academics is enabled by UoY structures (section 1a) and through multiple, strong and sustained local and regional partnerships supporting clinical collaborations with, for example, York Teaching Hospitals NHS Foundation Trust, South Tees Hospitals NHS Foundation Trust, Tees, Esk and Wear Valleys NHS Trust and Leeds and York Partnership NHS Trust. These partnerships and those with our global partners (e.g., The Aga Khan University and Khyber Medical University, Pakistan) enable our clinical academics to lead interdisciplinary research in designing and evaluating interventions through a range of methodological approaches. Our clinical academics also lead national NHS initiatives: for example, our trials in children and young people's mental health services within the Centre for Addiction and Mental Health (Wright); and global research in mental health and tobacco cessation (Gilbody, Siddiqi N, Siddiqi K). Our ability to further integrate and support clinical academic roles across mental health, global health and public health was enhanced by investment through the 70% expansion in undergraduate medical places awarded to HYMS in 2017. Integration across our clinical and translational research environment (*IES paragraph 45*) has also been realised through the York Biomedical Research Institute helping to create academic and NHS clinical collaboration for our health researchers (Crouch, Lacey, Mason-Jones, Newton, Roman, Smith, Van Der Feltz-Cornelis).

Early career researchers (ECRs)

ECRs are vital to the success of health research at York. Our 23 UOA 2 ECRs (21.6 FTE), are embedded within established research groups where, in addition to formal training, they are supported and mentored to develop skills and expertise in grant submission, managing research projects and teams, publishing and research impact. In addition to the mechanisms described above, we commit time and resources to supporting their development and career progression including through conference attendance, external and internal training, research leave, and

career development mentorship for internal promotion. As an example of helping individuals to build research skills, we offer a developmental small research project scheme, which awards protected time for ECRs to undertake (mostly methodological) projects in their area of interest. Our probation approach includes mentoring (*IES paragraphs 29*) and we have embedded the Concordat principles into how we support the Career Development of Contract Research staff (*IES paragraphs 27-28*). Our research expectations include supporting teaching which is exemplified through our Research Integration and Career Support group supported by a senior nursing academics (Flemming, Galdas) and senior career researchers (Mdege, Tharmanathan). Our expectations also take account of probation periods with adjustment in terms of grants and outputs. Our research committees have oversight of the expectations and support processes. Research group leads and senior departmental staff oversee our proactive approach to career development and redeployment, which has been successful in retaining staff.

We have benefited from the UoY Research Fellowship Programme which supports postdoctoral fellows and ECRs to develop their research careers at York and we have a strong fellowship support network. Heads of Department, research leads and our research officers encourage and support staff to pursue career fellowships from a range of funders (e.g., NIHR, ESRC, Wellcome and MRC), at all levels of seniority. These opportunities, advertised and promoted through our research groups, are allocated one-to-one support from a staff member with proven experience in securing and mentoring successful applications, and harness the experience and knowledge of our research leaders and previously successful applicants. Our commitment to supporting the continuity of careers means we encourage staff to move through different levels of fellowships (section 4). During successive awards we support and mentor staff to achieve independent status; and in turn encourage recruitment of the next generation of research fellows, doctoral students and research leaders. As an example, a current member of staff who was a PhD student in the last REF period (supervised by Siddiqi K), was appointed as a postdoctoral researcher in global health (2014) and then as a global health lecturer in 2018 (Dogar). Her research contribution is evident in the studies underpinning impact where she played a major part in facilitating practice change in tobacco cessation behaviour interventions in Pakistan.

Postgraduate Research Students

We continue to prioritise provision of doctoral research supervision as evidenced by securing 59 funded studentships over the period: 12 through external partnerships (e.g., White Rose and NHS Trusts, Born in Bradford project); 8 through doctoral fellowships (Wellcome, NIHR, MRC) and 39 funded by UOA 2 departments/UoY. We also secured 10 international doctoral studentships funded by cultural bureaus, embassies and education ministries in countries such as Chile, Indonesia, Kuwait, North America (Mexico), Peru, Saudi Arabia and Turkey.

Our staff engage potential PGR students early in the application process which is helped by our web pages specifying research areas of interest with contact details. Our reputation for supervision of international PGR students means that on average around 40% of PhD students are from overseas. We have established a European Training Network (Improving Quality of Care in Europe), a collaboration between six European Universities funded by the EU Marie Skłodowska-Curie Actions Programme, to support research by PhD students.

Research students are valued members of our research groups and their careers are supported in accordance with the Researcher Development Concordat. They are supervised and mentored to acquire their desired qualification whilst benefiting from - and contributing to - our research ethos (*IES paragraphs 30 – 34*). Our doctoral research and PhD supervision is operationalised through York Graduate Research School and Departmental Research Committees, both of which monitor supervision and progress. Integration of PGR students into the research culture is supported initially through their research group, but extending into wider interdisciplinary teams of staff and other PGRs. As members of our researchers' forum, they are made welcome at seminars, discussions and social events. PGRs are represented on Athena Swan and EDI committees.

Our PGR students gain additional support and resources from our two faculties (Sciences and Social Sciences), aided by significant UoY investment in the Research Centre for Social Sciences (ReCSS), which provides dedicated office space and access to research infrastructure. Across UOA 2 we run regular seminars, where PGRs are encouraged and supported to present. As part of our initial and ongoing COVID-19 response the UoY emphasised that all PGR students should be supported to the same extent as our staff.

Throughout the assessment period we recruited over 100 doctoral students, 15% of whom studied part time, aligning with our commitment to support professional development of NHS staff. Sixty-seven students were awarded PhDs in the assessment period.

PhD success is underpinned by support and monitoring to aid progress and to help identify any students who are struggling, either because of the demands of their PhD, or as a consequence of other social/family situations. Student mental health is a priority and is supported by a Student Mental Health and Wellbeing Strategy and virtual Student Mental Health Hub launched in 2018. Students also have access to the UoY Open Door Team and to a designated departmental student welfare team in DoHS. Mental health awareness is instilled in our staff through their initial induction and thereafter through our research forums, mentoring scheme and PhD related meetings (e.g., thesis advisory and progression meetings), where students are given time to reflect and raise any challenges or problems. Doctoral supervision forms part of our departmental research expectations with staff time allocated to carry out supervision and associated support in the form of Thesis Advisory Panel and Progression meetings. Postgraduate supervision is promoted as a mutually beneficial partnership between the student and supervisor leading ultimately to PhD success with the added benefit of successful publications based on their doctoral studies (e.g., an average of 2 published papers per PhD student). Our students have won awards for their research for example ‘Best Paper published in the journal Heart in 2016’ by Valtorta (supervised by Gilbody, Kannan); Vitae 3MT® UoY winner and national semi-finalist in 2020 by Kidwai (supervised by Kanaan, Mdege, Siddiqi K); New Investigator Award (2019) British Association for Cardiovascular Prevention and Rehabilitation to Sever (supervised by Doherty, Golder).

We are partners in The White Rose University Consortium, a strategic partnership between the Universities of Leeds, Sheffield and York, which includes support for Clinical Doctoral Fellowships for Nurses, Midwives and Allied-Health Professionals. We support training in research-related activities including an Academic Foundation Programme. To support topic-specific learning and broaden the learning experience, supervisors work with PGRs to create an appropriate package of level 7 PG modules.

We also facilitate teaching and citizenship opportunities to help students acquire broader life skills and experiences; and to improve their opportunities for future employment. Supervision sessions regularly discuss these options, tailoring them to align with the individual’s needs, requirements of planned studies and future career aspirations. Employability is considered part of module learning outcomes and a feature of supervision. Further, students are offered career advice, interview support and CV writing by the UoY careers’ service, which also offers access to career fairs. Final destination statistics for UOA 2 indicate that research students report 86.7% positive alignment between PhD topic area and first job following graduation; and 96.7% employment at six months.

York’s Research Student Community is run by researchers and research students. This ensures ‘state of the art’ communications including interactive forums and blogs alongside relevant news and information to support students through progression, thesis submission and viva voce preparations. PGR students in health research at York benefit from and contribute to our Researchers Forum, which spans UOA 2 staff and PGR students. We have also secured NIHR and Wellcome doctoral fellowships and subsequently obtained career and advanced fellowship for the same individuals (Golder, Fraser).

Equality and diversity

Our approach to Equality, Diversity and Inclusion is underpinned by UoY infrastructure and resources in the form of the Athena Swan, Researcher Development Concordat and Equality, Diversity and Inclusion (EDI) committees; all of which have health related researchers as committee members. UoY commitment to EDI is operationalised through four departments, three of which are led by women (Goddard, MacLeod, Stewart). Our approach is tailored through performance and development reviews overseen by our research committees, research leads and principal investigators, departmental management teams and heads of department. We work hard to create an inclusive culture that supports career development and promotion by offering opportunities to all. We invite expressions of interests, with supporting role specification, for all key committee appointments and we monitor equality in terms of applications and appointments.

In concert with UoY research performance expectations (*IES paragraph 22*) our UOA 2 research expectations were developed through discussion and consultation with academic and research staff, Concordat Leads and the Contract Researchers Forum. This resulted in a proportionate and flexible approach, including adjustments to reflect individual circumstances.

All UOA 2 departments hold either a Silver or Bronze Athena Swan award; and the principles of Athena Swan underpin our working practices. This is evident through inclusive staff membership of our departmental committees, working groups (e.g., Concordat, Athena Swan) and our transparent approach seen through our regular staff open forum and researchers' forum. We take seriously our responsibilities under the UK Equality Act, 2010 and take positive action, through our committee memberships and expressions of interest, in respect of individual protected characteristics. Staff and PGR students have access to multifaith prayer rooms across the university, one of which is allocated within a UOA 2 department. Our approach remains vigilant to discrimination and disadvantage. We continually adapt our processes and promote inclusiveness through positive action. An example of this is seen through our EDI work by having an LGBTQ champion on our EDI committees and the Athena Swan Working Groups.

We recognise that each individual researcher has different personal circumstances. We are committed to ensuring that everyone's needs are respected and considered. Throughout UOA 2, we offer and support flexible and remote working arrangements for our researchers, taking into account working practices and equipment requirements. Our approach to remote working has further advanced in response to the pandemic and social distancing rules, but equally we have supported researchers who wish to return to the workplace to do so safely, in accordance with government guidance, in order to optimise staff well-being. We also adapted our Domestic Abuse and Violence policy around safety at work and our researcher safety policies for interviews in response to COVID-19.

We implement flexible policies and supportive working practices to ensure staff are able to develop their research careers (*IES paragraph 24-25*). This includes career breaks, to support researchers in work - respecting protected characteristics (*IES paragraph 36*) - and when staff return from periods of leave or ill-health, are managing long-term conditions or have caring responsibilities.

Across our departments we regularly interrogate data of PI/CI participation in grant applications by individual characteristics. This enables us to track the effectiveness of our research expectations, Athena Swan and EDI action plans. We also have a 'bank' of successful promotion applications, which are shared with those considering promotion. There is a collection of 'readiness for promotion' data, following conversations with line managers. Guidance is developed for chairs of all recruitment panels setting out good practice and mitigation of unconscious bias. Training on equality and diversity is mandatory for all staff.

One example of empowerment is through the work of our Contract Researchers' Forum and their awareness raising event on tackling inequalities in securing research support, promotion and external funding. Forum events in 2019/2020 highlighted the benefits of adopting a proactive

approach to 'Black Lives Matter', which generated considerable interest and led to a shared aim to increase staff awareness of the biases that can pervade decision making. This led to an online discussion, jointly hosted by our EDI committee and the Forum, where individuals shared their experiences of bias and inequalities. The event was recorded to ensure staff had the opportunity to increase their awareness and adopt proactive approaches to tackling inequalities including monitoring to ensure the cultural sensitivity of their research grants. Core members of Our Black Lives Matter group and Chair-EDI committee are actively involved in shaping our research expectations.

Throughout the first COVID-19 national lock down we used our open staff forums to check how staff were feeling about adjustments to working practices (i.e., home working). Supported by one of our mental health research professors (van der Feltz-Cornelis) we gained further knowledge of the extent of these challenges through a staff and student survey which raised awareness and helped inform our approach to staff wellbeing, which included the introduction of a range of flexibilities, especially the principle of 'do what you can, when you can' for those with caring responsibilities.

Using UoY REF equality data the average number of outputs per researcher by 10 year incremental age categories from 30 to 69 years, was 2.2, 2.0, 2.6 and 2.5 per FTE staff. The same analysis by 'declared disability' compared to 'no declared disability' showed equal numbers of outputs between categories. Analysis demonstrated a slightly lower number of outputs per researcher for those identifying as belonging to Black, Asian and Minority Ethnic groups, when compared to staff where ethnicity was reported as 'White'. There was a slightly lower number of outputs per female researcher, compared to males. Further equality analysis (considering age, disability, ethnicity and gender) of 'predicted quality rating of outputs' showed no significant differences in relation to protected characteristics. Our audit data is shared with the EDI committee and continues to inform strategy.

Our research activities contribute to intellectual debates whilst actively seeking to identify disadvantage, reduce inequalities, and tackle discrimination through national awareness, implementation of policy and change in health and social care practices. Research collaborations and partnerships are distributed locally, nationally, regionally and globally. We maintain a network of academic institutions and researchers from the UK, Europe, Americas, Asia, Asia Pacific, Africa and the Middle East. These collaborations are equal, as we work together to develop and implement solution based interventions to improve health service policy, delivery and outcomes (section 1c).

Over the REF period all staff involved in this submission underwent EDI training and adhered to the UoY Code of Practice. These staff took care in adhering to EDI principles when considering eligibility of staff (e.g. independent researcher status), output section/attribution and ICS inclusion and authorship. REF related communication with staff was carried out in accordance with the UoY Code of Practice. We also applied appropriate checks and balances in that all decisions around staff eligibility, outputs and ICS were done collectively through our UOA 2 REF team and the relevant Head of Department.

3. Income, infrastructure and facilities

Research income summary

Aided by the strategy and structures outlined in section 1 UOA 2 staff have, over the assessment period, been awarded research grants representing a total research income of £101,078,504, with an average of £14.4m per year. In 2019/20 research income was £18.14 million, a £5.5 million increase compared with 2013/14 (figure 1) and accounting for 26% of all UoY research income (Figure 2).

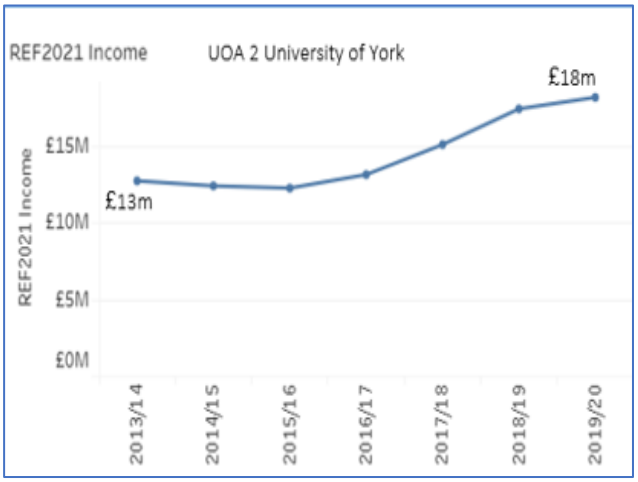

Figure 1. Research income in REF period income.

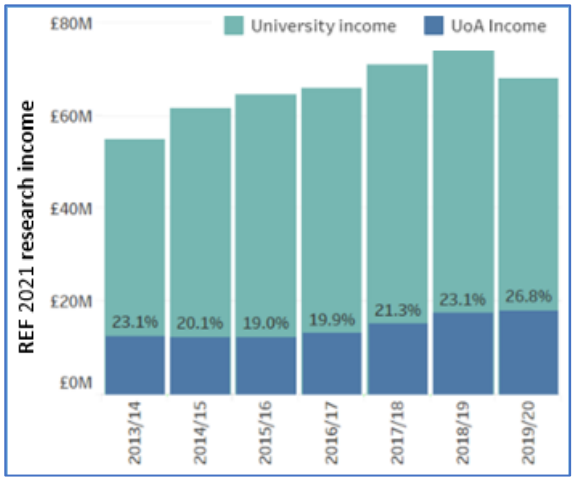

Figure 2. UOA 2 proportional research

Infrastructure and facilities

We have made (in-period) strategic appointments (section 2) across our three core areas of **(HTA, Health Policy and Public Health)** ensuring critical mass which has helped secure record levels of grant income. Examples of how our core research infrastructure has supported staff to sustain funding are highlighted below.

Health Technology Assessment

Building on a substantial and successful infrastructure, during this REF period our staff expertise and data analytical capacity has expanded (section 1 & 2) enabling us to bid successfully for two further NIHR Technology Assessment Review (TAR) awards; the latest (£6.4 million) funding our TAR programme of research to 2027 (Bojke, Dias, Eastwood, Hodgson, Palmer, Rothery, Soares, Simmonds, Stewart, Walker, Wade); two NIHR Cochrane Infrastructure awards, the latest (£950,500) funding the Cochrane Common Mental Disorders group (CCMD) from April 2020 to 2025 (Churchill) and three NIHR Cochrane Programme grants (McGuire 2014 to 2022).

We have continued to invest in senior leaders (Adamson, Rangan, Sheard) in YTU alongside enhanced IT software and modelling capacity allowing us to handle large and sometimes complex datasets. Collectively our staff and infrastructure has sustained a research programme that collectively generates £4m per annum, including notable trials such as: CASPER and CASPER PLUS; Collaborative care in screening positive elders with major depressive disorders (Adamson, Gilbody, Hewitt); SCIMITAR and SCIMITAR + Smoking cessation for people with severe mental illness (Gilbody, Hewitt, Parrot); NIHR PROFHER (1&2); and UK FROST surgical trials (Corbacho, Hewitt, McDaid, Rangan, Torgerson).

Strategic investment in global health including five senior appointments (section 2); MoUs with international partners (section 4); and support for long term secondments working in and low-middle income countries has enabled our researchers to develop interventions and implement trials in LMICs. These include evaluations of varenicline among hookah smokers in South Asia (£144k - Kanaan, Siddiqi, K); brief motivational intervention to modify life-style behaviours to improve TB outcomes in South Africa (PROLIFE £132k - Dogar, Parrott, Siddiqi, K,); NIHR

Global Health Research Group: Improving Outcomes in Mental and Physical Comorbidity and Developing Research Capacity (IMPACT) in South Asia (£7478k - Gilbody, Churchill, Hewitt, Jacobs, Siddiqi, N. & Siddiqi, K); Development of health opportunity costs in the global context (Revill, Suhrcke). Major funding for the *Thanzi La Onse* programme and the NIHR Global Health Econometrics and Economics Group was obtained in the first tranche of GCRF funding (£2.5m - Sculpher, Chalkley, Griffin, Revill, Walker and Woods).

Other significant grants include two European Commission funded projects exploring the development of evaluation guidelines across Europe and personalised medicine (£778k; £577k, Iglesias, Manca); a project on the 'wearable clinic' (EPSRC, £456k Iglesias, Manca) and research on expert elicitation (MRC, £369k, Bojke, Soares).

Health policy

We have secured long term funding from DHSC/NIHR to support health policy research for over 25 years. Policy research at York has grown substantially, reflecting the quality of our research outputs and partnerships. Testimony to the calibre of our infrastructure and staff expertise is the continued leadership of two NIHR Policy Research Units (PRUs): the NIHR PRU in economic methods of evaluation in health and social care interventions (EEPRU, 2010-2018, £3.1m) and (EEPRU 2018-2023, £2.5m) led by Sculpher; and the NIHR PRU in economics of health systems and interface with social care (ESCHRU 2010-2019, £5.8m and ESCHRU II 2019-2023, £3.1m) led by Mason. CRD (Sowden) co-leads the NIHR Policy Research Programme (PRP) Policy Reviews Facility to support national policy development and evaluation, in partnership with the EPPI Centre at UCL (2014-2020 £1.2m) with ongoing funding agreed until 2025 (1.4m). The NIHR PRP Fast Response Analysis Facility is co-led by Bloor in partnership with the King's Fund (Partnership for Responsive Policy Analysis and Research (PREPARE - 2015-2020 £1.25m, 2020-2025 £1.25m).

UoY is a collaborator in the multi-institutional Policy Research Unit in Public Health (2019-2024) (Sculpher, Sowden) which builds on earlier success via the DHSC PRP funded Public Health Research Consortium (2005-2019, £1.7m).

Our ability to carry out real world policy analyses is enhanced through our strategic investment in the form of secure data storage. Data linkage with NHS Digital and high performance computing allows us to better analyse complex data across linked datasets most notably through Clinical Practice Research Datalink (CPRD) and Hospital Episodes Statistics (HES) data.

Since 2014 we have developed our global health policy research, with a particular focus on low and middle-income countries. This is a cross-cutting theme drawing on expertise from different research groups, through the University's Interdisciplinary Global Development Centre (IGDC). It includes:

- Evaluation of the impact and value for money of population and system level interventions with partners in Brazil, Indonesia and South Africa NIHR Global Health Econometrics and Economics Group (2017-2021) (Suhrcke, Moreno-Serra, Chalkley);
- Investigating the consequences of long-term internal conflict in Colombia for health and the health system, providing evidence-based guidance for the design of policy pathways that address post-conflict health system needs. MRC/ESRC/DFID/Wellcome Trust (Joint Health Systems Research Initiative) (2018-21) (Moreno-Serra);
- The role of fiscal policy in improving health behaviour, mostly on sugar-sweetened beverage taxes in both high and LMICs (e.g., Peru, Chile, S Africa) (Suhrcke);
- Improving diet, reducing obesity and other chronic diseases, BBSRC, MRC (Newton);
- Defining and Implementing Novel Psychosocial Interventions, EU Horizon 2020 funds for Refugee Emergency (Churchill).

Public Health

Our public health research infrastructure has expanded through stronger partnerships and networks aided by strategic appointments in global public health (Elsey, Dogar, Suhrcke). Born in Bradford's Better Start experimental Phase 2 birth cohort (£1,327m, Bloor, Bywater, Pickett, Richardson) and Innovation Hub (£989k, Pickett) are Big Lottery-funded projects leading to the evaluation of 20+ preventive interventions to improve health in pregnancy and the early years. The BiB infrastructure and partnership also underpin the public health research centred on families within the NIHR Yorkshire & Humber Applied Research Collaboration which builds on our research within the former Yorkshire CLAHRCs (Pickett, Bywater). Our Yorkshire-London based ActEarly collaboration, funded by the UK Prevention Research Partnership, focuses on system-wide change for children for the long-term prevention of chronic disease (Pickett, Cookson, Bywater) and innovative school-based screening and assessment programmes for autism (Wright). We were an active partner in the DHSC PRP Public Health Research Consortium until 2019 and continue this work through our current collaboration with the NIHR Public Health Policy Research Unit (Sowden, Sculpher, Griffin). We also have a strong research programme on food policy and food insecurity (Power, Pickett) within the York-led N8 Agrifood partnership and the Global Food Security-funded programme Integrating Knowledge for Food Systems Resilience (IKnowFood).

We continue to optimise our infrastructure through networks which are built on collaborative expertise from long-standing relationships with policy makers and external bodies to undertake policy-relevant research (for example, see above Policy Research Unit in Public Health). Our health research environment and network of collaborators has enabled our success across NIHR programmes of research and benefitted from the extension of a Policy Reviews Facility in partnership with UCL (Sowden) re-tendered until 2025; long-term funding from the BHF from 2014 to 2022 (Doherty); ESRC Improving health and reducing health inequalities for people with severe mental illness: the 'Closing the Gap' Network+ (Gilbody).

UOA 2 researchers have also built on established collaborations and networks in LMICs. Those which have played a key part in our Global Challenges Research Funding (GCRF) success include: Tobacco control capacity programme MRC (Siddiqi K); NIHR Global Health: Improving Outcomes in Mental and Physical Comorbidity and Developing Research Capacity (IMPACT) in South Asia, (Gilbody); NIHR GCRF: GHE2 - The Economics and Econometrics of Global Health Systems, Programmes and Policies (Suhrcke); MRC GCRF: Thanzi la Onse (Health of All) and Frameworks and analysis to ensure value for money healthcare (Sculpher, Revill).

Wider infrastructure supporting research and impact

Our departments enjoy close working relationships with the UoY Research and Enterprise Team, who support strategic and operational aspects of research, knowledge transfer and impact. Grant development support has been significantly enhanced, including designated UoY Research Grants Operations team support to reduce the burden on our staff in respect of contracting, data sharing agreements and IP and legal matters. The combination of this support and the skills of our researchers has enabled us to achieve a 1 in 3 grant application success rates in recent years.

UOA 2 researchers work across three large connected or adjacent buildings that incorporate the Alcuin Research Resource Centre (ARRC), which houses a dedicated suite of research facilities including research interview, focus group discussion rooms and a data analysis laboratory. ARRC houses a 150-seater modern auditorium and exclusive use of seminar rooms by research teams. We also benefit from the Research Centre for Social Sciences (ReCSS), which has facilities for research meetings, conferences and a well-used training suite. ReCSS facilitates interdisciplinary research across doctoral programmes and provides PhD students access, 24 hours a day, to printing, photocopying and scanning facilities; and with lockers, kitchens and social space (see section 3) as well as providing desk space for up to 80 PhD students and NHS researchers. All PGR students benefit from the full suite of IT systems and software that includes qualitative and quantitative analysis systems supported by senior data analysts and academics.

UoY has invested in technology and IT infrastructure (*IES paragraphs 10, 41*) including a Data Safe Haven, Viking Research computing cluster and high-performance computing to enable complex analyses of extremely large datasets. Health research at York has benefitted from such investment, enabling us to link and analyse health datasets to address policy questions and evaluate the impact of health interventions. Projects using linked data include decision analysis and economic evaluation in cardiovascular disease (Walker, Manca, Sculpher, Palmer); tackling under-diagnosis in dementia (Mason, Goddard, Jacobs); quality of primary care for serious mental illness (Jacobs, Mason, Goddard); evaluating the impact of medical revalidation (Bloor, Gutacker); and analysing the impact of payment mechanisms on healthcare delivery (Gravelle, Doran, Gutacker, Jacobs, Chalkley). Through our annual courses in analysing patient level data, we have trained academics, policymakers and health professionals to understand and analyse administrative health data.

Our operational infrastructure has enabled us to host clinical registries to evaluate and optimise clinical care including: Haematological Malignancy Research Network (Roman, Smith); Patient Case Management Information System for mental health services (PCMIS) (Gilbody and McMillan) and the BHF National Audit of Cardiac Rehabilitation (Doherty).

Our clinical academic resources have benefited from a £5.8 million infrastructure investment as part of the expansion of our Medical School (HYMS), which has also helped develop new clinical research facilities with York Teaching Hospitals NHS Foundation Trust.

4. Collaboration and contribution to the research base, economy and society

Research collaborations

Our commitment to working in partnership with local, regional, national and international stakeholders is a key part of our research and impact success (figure 3). Our partnerships are built around a common recognition that research is most useful when done collaboratively with people and organisations with shared values. Utilising our infrastructure and facilities (section 3) health researchers at York are supported (section 2) to pursue positive and sustained stakeholder engagement and funding across all sectors of society. Examples of this, over the assessment period, are evident in our illustrated impact approach (Figure 3) and in our seven submitted ICS (see REF 3).

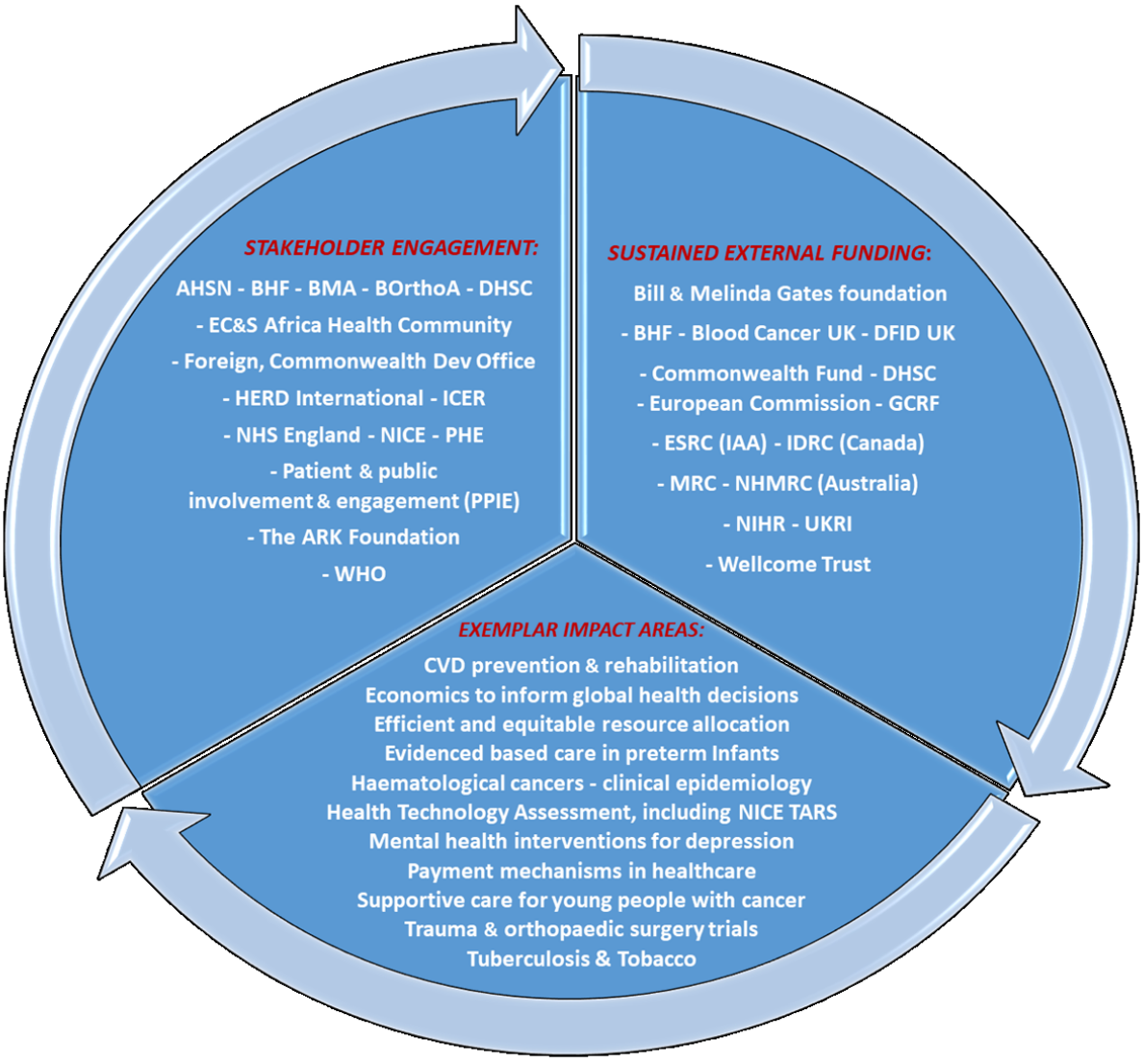

Figure 3. Exemplar illustration of University of York health research impact approach.

We collaborate widely with academic, practice and policy partners, and with patients, service users and the public, to ensure that our research combines excellence with relevance and impact. Our commitment to collaborative working is evidenced by over 80% of our research outputs and research grants involving national and international partners. Publication metrics show that 83.5% of our UOA 2 outputs were the product of national (43%) and international (40.5%) collaborations; and 95% of our UOA 2 outputs involved more than one author, with a mean Field-Weighted Citation Impact of 3.26.

Aligned with UoY strategy (*IES paragraph 6,9,20*), international partnerships are integral to our research. Analysis of research grant activity shows successful collaborations with nineteen European countries; thirteen Asian countries, eleven African countries; five South American countries; North America (Canada and America); Australia and New Zealand. Of 581 successful grant applications made during the assessment period 45% were internationally collaborative.

Analysis of grant collaboration by sector shows the highest levels of collaboration with other universities (42.9%), followed closely by the NHS & charities combined (39.3%) (Figure 4).

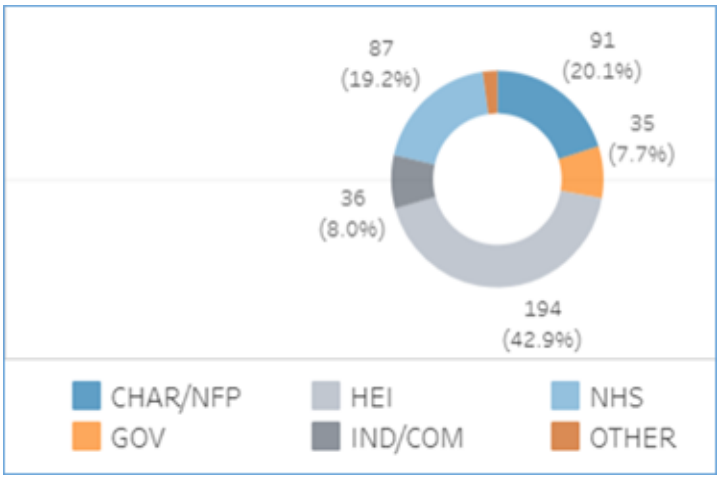

Figure 4. Percentage of research grant collaboration by sector.

Our success is underpinned by a commitment to collaboration and partnership including through hosting visiting researchers and senior fellows, and honorary fellows and professors (e.g., Elias Aboujaoude (psychiatry and behavioural sciences); Martin Bland (statistics); Tony Culyer (health economics); Keith Derbyshire (health economics); Sally Kinsey (paediatric haematology); Sam Oddie (neonatology); Mike Reed (surgery); John Wright (public health and epidemiology).

Contribution to the Research Base, Economy and Society

International contribution

Across UOA 2 we work internationally with government agencies, NGOs and voluntary and community organisations. In Pakistan, Bangladesh and Nepal, we collaborate with health ministries to lead intervention development and successful trials in tackling TB. These include Action to Stop Smoking in Suspected Tuberculosis (ASSIST) (Siddiqi K) and impact work focusing on integrating and scaling-up smoking cessation within TB control programmes in Bangladesh, Nepal and Pakistan (Dogar, Elsey, Kannan, Parrott, Siddiqi K).

We have developed and refined methods of economic evaluation for application to public health interventions in Low & Middle Income Countries (LMICs), most notably for health benefit package design and evaluation to promote health and reduce health inequalities in LMICs (Griffin, Revill, Sculpher, Walker).

We have initiated MoUs between the UoY and the Health Services Academy (Islamabad, Pakistan); East, Central and Southern African Health Community; Makerere University School of Public Health (Kampala, Uganda); and the Ministry of Health (Uganda). One impact related example comes from our TB & Tobacco (Siddiqi K, Dogar) research, which through long-term funding (e.g., DFID UK AID, GCRF, HERD International, Wellcome and the UoY Centre for Future Health) and partnership working (see Figure 3), produced impact on tobacco cessation interventions in Pakistan.

UOA 2 researchers have led wider education, training and capacity building activities. This includes creating the first knowledge hub in global health economics on the Global Health Network, funded by GCRF and in partnership with the East Central and Southern Africa Health

Community (launched May 2020). The hub provides free education and training in health economics. We also have hosted annual (since 2015) health economics training for Overseas Development Institute Fellows before they take up their postings in Health Ministries and other organisations in LMICs.

International collaborations and partnerships in evidence synthesis are exemplified by roles within Cochrane. We host the editorial base of CCMD (Churchill) working with more than 1200 authors across 35 countries and in the assessment period have managed and supported the conduct and publication of 99 new or updated reviews in the Cochrane Library (12 of these co-authored by York researchers).

We co-lead Cochrane Neonatal research through NIHR Cochrane Programme grants (McGuire), working with more than 1100 authors in over 62 countries. During the reporting period, Cochrane Neonatal has supported and published 196 new or updated systematic reviews (23 of these authored by York researchers).

We provide methodological leadership through co-convenorship of four Cochrane methods groups: Adverse Events (Golder); IPD Meta-analysis (Stewart); Qualitative and Implementation (Flemming) and Statistical Methods (Simmonds). We co-authored four chapters of the most recent Cochrane Handbook (Flemming, Golder, Simmonds, Stewart), the MECIR Standards based on this (Churchill) and contributed to a reporting guideline on synthesis without meta-analysis funded through the Cochrane Methods Innovation Fund (Sowden). We have also led or been members of international groups developing PRISMA reporting guidance for several types of systematic review (Golder, Stewart) and tools for assessing risk of bias and conflicts of interest in reviews (Churchill, Stewart).

We offer a suite of short training courses to national and international participants annually in economic evaluation methods and data analysis to professionals from health care, national HTA organisations, the pharmaceutical industry, as well as academics; training in IPD meta-analysis; the Cochrane risk of bias tool; qualitative evidence synthesis informing guideline development; and the evaluation of medical devices.

National, regional and local contribution

Nationally, we work collaboratively to support research and use of research evidence, within health, social care and third sector stakeholders. As well as working directly with governmental organisations and policy makers through our Policy Research Units, Policy Reviews Facility and Fast-response Analysis Facility (section 1b), we have worked with NHS England, for example, on QoF (Cookson, Doran) and quality indicators for CVD prevention services (Doherty - see REF3). Staff are members of NICE appraisal and highly specialised committees (12 staff during the assessment period), which recommend new drugs and technologies should be made available in the NHS in England and Wales. In addition, we provide methodological support and guidance to NICE through the NICE Decision Support Unit (Dias, Palmer).

Our UOA 2 mental health researchers working with NHS colleagues, developed and embedded a national Patient Case Management Information System (PCMIS) in routine primary care practice (Gilbody, McMillan). Building on a Grow MedTech award in 2019 PCMIS has developed patient outcome feedback technology for 49 NHS Trusts in England utilised by over 250,000 patients per year as part of Improving Access to Psychological Therapies (IAPT) services. PCMIS is now a subsidiary company of the University of York.

Partnership with - and provision of - research leadership for third sector organisations include serving as Head of Research for Hospice UK (Flemming, seconded two days per week); and directorship (Fraser) and board membership (Bloor, Phillips) of the Martin House Research Centre, a partnership between Martin House Children's Hospice, the University of York and University of Leeds Academic Unit of Palliative Care. The Equality Trust was founded by one of our professors (Pickett). We also work closely with the Mental Health Foundation (Churchill, Gilbody, McMillan).

Regional research collaborations include: the White Rose Consortium involving York, Sheffield and Leeds, which has a longstanding history of carrying out health related research projects that also benefits from shared supervision of PhD studentships; participation in the N8 Research Partnership, a collaboration of the eight most research-intensive universities in the North of England; and membership of the Northern Health Sciences Alliance, a collaboration bringing together ten universities, ten research-intensive NHS Trusts and four Academic Health Science Networks. York UOA2 staff also co-lead Rapid Evidence Synthesis Training across the N8 AgriFood programme.

York health research supports local decision making through the development of evaluation methods to inform resource allocation decisions in situations of limited and imperfect data, working with Hospital Trusts, Clinical Commissioning Groups and Local Authorities (Bojke, Richardson).

Our research infrastructure and leadership extend across Yorkshire and the Humber. We are currently partners in two NIHR ARCs, the Yorkshire and the Humber ARC where York is responsible for three key research topics (mental health (Gilbody), health inequalities (Pickett) and health economics (Bojke); and the North East and North Cumbria ARC, where we contribute to two themes (Integrating Physical Health, Mental Health and Social Care (Churchill, Van Der Feltz-Cornelis); and Science of Knowledge Implementation and Mobilisation (Churchill), aiming to link priority themes across both ARCs. From 2014-2018 we led research themes within the CLAHRC delivered over a five year period of funding from NIHR. We are academic partners in Yorkshire and the Humber Academic Health Science Network and the Improvement Academy in partnership with the Bradford Institute for Health Research.

The UoY Centre for Future Health (*IES paragraph 43*) has enabled innovative research across all disciplines whilst supporting external partnerships and advancing knowledge exchange. A core collaborative project, supported by the Centre for Future Health, included the development of a region-wide PPIE network utilising the expert knowledge of patients and carers with experience of NHS and social care, to ensure the continued relevance of our research. Following piloting in 2018 the network 'Involvement@York' was launched in January 2019. This is a collaboration project with York Teaching Hospitals NHS Foundation Trust and Tees, Esk and Wear Valleys NHS Foundation Trust.

Responsiveness to national and international priorities and initiatives

Health research at York response to the Coronavirus (COVID-19) pandemic
In recognition of the impact of the first-wave of COVID-19 we prioritised research relating to health service delivery and the urgent need for rapid analysis and evidence reviews. Our response centred purposefully on existing research and clinical strengths, delivering evidence to support DHSC, NHSE and PHE decision-making, particularly through the PRUs, NIHR PRF and PREPARE. This included rapid research on post-ICU syndrome and COVID-19 (Bloor); risk of infection transmission from aerosol generating medical procedures, for the Independent High Risk Aerosol Generating Procedures Panel and DHSC (Sowden). Since March 2020, CRD working with UCL and LSHTM produced a living systematic map of COVID-19 research evidence (Sowden) and in March 2020 PROSPERO prioritised registration of COVID-19 reviews to support international efforts to understand the evidence pipeline and reduce duplication of effort (Stewart), also becoming a partner in the international COVID-END initiative.

Our mental health researchers secured NIHR funding in May 2020 for a clinical trial (BASIL-C19) aimed at preventing and mitigating the onset of depression and loneliness among the most vulnerable in society as a result of the COVID-19 lockdown (Gilbody). This is the only mental health study registered as part of the NIHR Urgent Public Health COVID-19 Studies call.

Policy focused research include mixed-methods research on 'levelling up' health and wellbeing in the face of inequalities produced by COVID-19 (Griffin); GCRF/Newton funded research

investigating the impact of social distancing on violence against women in Brazil (BRAVE) (Moreno-Serra) and rapid reviews on palliative care as part of the Oxford COVID-19 Evidence Service (Flemming).

We led rapid development and implementation of national guidelines for treating neutropenic sepsis in children with cancer; enabling more children to be treated on a 'virtual ward', reducing risk of COVID-19 infection and pressure on services, which is captured in one of our ICS (see REF 3 Morgan, Phillips, Stewart, Wade).

At the request of NHS England and NHS Improvement we carried out first wave COVID-19 analysis using BHF national registry data (hosted at UoY) quantifying the impact of cardiac rehabilitation service adaptation and NHS staff redeployment on service uptake (Doherty). We co-led a UK wide initiative, including training of NHS staff online, to enable older patients - shielding with heart failure- to exercise safely at home which, is captured in one of our ICS (see REF 3 Bojke, Doherty, Harrison and Hinde).

Indicators of wider influence

Journal editorial roles and refereeing

UOA 2 submitted staff had **senior editorial roles** with the following journals during the REF period: British Journal of Psychiatry; Cancer Epidemiology; European Journal of Psychiatry; Frontiers in Psychiatry; International Journal of Mental Health and Deafness (Chief-Editor); NIHR Journals Library; Scottish Journal of Political Economy; Systematic Reviews (Co-Editor in Chief); Social Science & Medicine; Medical Decision Making; The Cochrane Library, Value in Health; Cogent Psychology; Health Economics and Health Policy. Staff also held associate editor roles with Archives of Disease in Childhood; British Medical Journal (BMJ); BioMed Central (BMC); Health Services Research; Bulletin of Economic Research; Ethnicity and Health; Maternal & Child Health Journal; Open Health Services and Policy Journal; Research Synthesis Methods; Systematic Reviews; The Cochrane Library BMJ Open; Journal of Health Economics; Journal of Health Services Research & Policy; Health Services Research; Value in Health The Cochrane Library; NIHR Journals Library, Archives Diseases in Childhood; Research Synthesis Methods.

All staff submitted as part of this UOA 2 regularly **referee** for most of the above journals alongside other leading health related journals including: American Heart Journal; BMJ; Bulletin of Economic Research; Ethnicity and Health; JAMA; Journal of Health Economics and the Lancet.

Participation in research funding committees

Academy of Finland (Bloor); Asthma UK Research Review Funding Panel (Iglesias); Brain Tumour Charity 2015 (Howell); British Heart Foundation (Doherty); British Society of Haematology (Roman, Smith); Commonwealth Fund/Institute for Healthcare Improvement International Program for US; Health Care Delivery System Innovation, International Expert Panel (Doran); Cancer Research UK's Prevention and Population Research Committee (Smith); Definitive Intervention and Feasibility Awards Full Application review panel (Hewitt); GCRF Project (Newton); Global Alliance for Chronic Diseases - Cancer Prevention Panel (Siddiqi k); Health Foundation COVID-19 call expert panel (Goddard); Irish Cancer Society (Howell); Medical Research Foundation (Siddiqi); MRC's Cross-Board Cohort Advisory Group (Roman); MRC Public Health Intervention Panel (Elsey); MRC/FCDO African Research Leader scheme (Siddiqi K); NERC's environmental exposures and health initiative (Roman); Newton Fund (Newton); NIHR Academy pre-Doctoral Fellowship Panel (McDaid); NIHR Advanced Fellowships (Macleod); NIHR Clinical Scientist (Goddard); NIHR Clinical Trials Unit Standing Advisory Committee (Hewitt); NIHR Doctoral Fellowships (Manca (deputy chair), Iglesias); NIHR Public Health Research Commissioning Board (Ferguson (Programme Director), Sowden); NIHR Health Technology Assessment Commissioning Board (Hewitt, Gilbody, McGuire); NIHR PRP 'Recovery, Renewal, Reset (Bloor (co-chair), Gutacker, Mason); NIHR Systematic Review Training Fellowships (Stewart); NIHR programme awards review panels (Gilbody, Glidewell, Churchill); NIHR Programme Grants for Applied Research (Sub-Committee D) (McDaid); NIHR

Research for Patient Benefit Yorkshire and North East (McMIllan, Sheard); Research Council of Norway (Goddard); Royal Society Future Leaders – African Independent Research (FLAIR) Fellowship Committee: Biological Sciences (Pickett); Wellcome Trust Society and Bioethics Expert Panel (Goddard, Doran).

Fellowships
The support structures for fellowships described in section 2, have helped secure the 28 externally funded competitive fellowships in the assessment period: BHF Postdoctoral Research Fellowship (Collins); NIHR Academic Clinical Fellowships (Cleminson, Hassan, Walsh); NIHR Clinical Lecturer in Paediatrics (Morgan); NIHR Systematic Review Fellowships (Beresford, Dale, Dietz, Walker, Walton); NIHR Pre-Doctoral Fellowships (Walker, Watson); NIHR Doctoral Fellowships (Bosanquet, Featherstone, Grasic, Jarvis, Moriarty, Santos, Valtorta); NIHR Post-doctoral Fellowships (Fraser, Golder, Valtorta); NIHR Senior Fellowships (Cookson, Fraser, Golder, Phillips) and Wellcome Senior Investigator Awards (Doran, Prady).

Prizes
UOA 2 staff (including ECRs) have won many national and international awards for the importance and content of their published work. These have been awarded by journals and by professional and academic bodies: BMJ, American Economic Journal, Value in Health, Journal of Integrated Care, Journal of Mental Health Policy and Economics, Value in Health, Medical Decision Making. Other prizes recognising the contributions made to academia and beyond, include awards for: outstanding contributions to cost-effectiveness analysis awarded by the Centre for the Evaluation of Value and Risk in Health, Tufts University, Boston; excellence in methods research on handling uncertainty to support decision-making and research prioritisation awarded by the International Society for Pharmacoeconomics and Outcomes Research (ISPOR), and an ISPOR award for distinguished service for leadership of methods taskforce; Royal College of Paediatrics and Child Health SPARKS Young Investigator of the Year, 2015, CHE was listed by Universities UK as one of the UK's best breakthroughs for significant impact on people's lives by making healthcare systems fairer and more efficient.

Research councils and national and international committees
In this assessment period UOA 2 staff have been active members of:

National organisations: Association of Medical Research Charities Chair; Health Foundation Efficiency Research advisory group Chair; High Pay Commission and Living Wage Commission; Irish Health Research Board; Lancet Commission on the Future of the NHS; Macmillan Cancer Support Research Advisory Panel; MRC Molecular and Cellular Medicine Board; MRC Population Health Sciences Group; NICE Technology Appraisal and Highly Specialised Technology Committees; NICE Methods Committees; NICE clinical guidance and topic based committees; NICE Public Health Advisory Committee, NHS Digital Board; NHS England Health Inequalities Delivery Group; NHSE&I National Strategic Nursing Research Advisory Board; Public Health Research Consortium; Royal College of Obstetrics and Gynaecology Academic Board and Council; Royal College of Paediatrics and Child Health Advisory Committee; Strategic Skills Fellowship panel; The Children's Society; WHO Panel on Research into Traditional Medicine; UNICEF UK.

International organisations: Advisory Group for the National Collaborating Centre for Methods and Tools, Public Health Agency of Canada; Bergen Centre for Ethics and Priority Setting; Centre for Evidence based Medicine Odense Advisory Board East, Central and Southern Africa (ECSA) Health Economics Community of Practice, lead external technical advisor; European Training Network - Improving Quality of Care in Europe (IQCE); International Network on the Economics of Mental Wellbeing; University of Twente (NL); International Scientific Advisory Board of the Graduate School of Health Economics and Management at Catholic University, Rome, Italy; ISRCTN Advisory Group; Luxembourg Institute of Health; MatchNet, a national research network funded by the MRC-led Prevention Research Partnership; Prioritarianism in Practice, an international research network; NHS England Independent Assurance Panel for Clinical Services; Society for Research Synthesis Methods; Systematic Review Data Repository

Governance Board; WHO: Coordinating qualitative evidence synthesis informing guideline development for complex interventions; WHO European Observatory on Health Systems and Policy and World Psychiatric Association Section on Mental Health Economics.

Invited keynotes, lectures and conference chair roles
Our staff are regularly invited to deliver keynote lectures and chair panels for academic and clinical conferences and are actively supported to do so. Some leading examples include; British Embassy: Japan-UK Symposium on Health Economics, Japan, Jan 2014; EuroPrevent 2018; First International Summit on Interventional Pharmacoeconomics, US, June 2020; HTA Asia Link Conference, Thailand, 2018; British Association of Perinatal Medicine 2019, UK Nicotine and Smoking Cessation Conference in 2014; School of Public Health, University of Michigan, 2017; British Society of Neuro-radiologists Annual Meeting, 2016; International Diabetes Federation conference, South Korea, 2020, Peruvian Ministry of Health, Peru, June 2020; WHO, Switzerland, 2016.