Institution: University of Aberdeen

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

a. Overview

Public Health, Health Services and Primary Care research at the University of Aberdeen is conducted within the Institute of Applied Health Sciences (IAHS), one of two medically-related Institutes (along with the Institute of Medical Sciences (IMS)) within the College of Life Sciences and Medicine. The IAHS was established in 1999 and this large cross-departmental, multidisciplinary grouping of university staff and NHS researchers (returned across Units of Assessments (UoA) 1 and 2) promotes and facilitates population-orientated health research. Our vision is to conduct world leading research and to achieve this we have, in 2011, co-located most researchers undertaking applied health science research by refurbishing existing accommodation (£2m Polwarth Building) and purpose-built accommodation (£5.9m Health Sciences Building). The emphasis in the IAHS is on inter-disciplinary working and, therefore, we have a single research strategy for the whole Institute. The principal research groupings within the Institute are the Health Services Research Unit (HSRU), Health Economics Research Unit (HERU), Population Health, Primary Care, and Applied Clinical Sciences. The first two are internationally renowned research units co-funded by the University of Aberdeen and the Chief Scientist's Office (CSO) of the Scottish Government. HERU was reviewed in June 2010 and the independent scientific review team concluded that "*the Unit has maintained its upward trajectory and has established itself as one of the best health economics groups in Europe*". In a 2012 bibliometric analysis of publications in health economics, HERU's director (**Ryan)** was ranked as the top health economist in the UK. The scientific review of HSRU in November 2011 concluded that *"... the Unit's performance over the past 5 years had been outstanding. Both substantive programmes of work were world class."* Core funding for both Units has been approved for a further five years.

b. Research strategy

The IAHS and IMS undertake research which addresses the two gaps in translation of biomedical science to healthcare identified in the Cooksey Report (Dept. of Health, 2006). The first gap (translating basic and clinical research into ideas and products) is addressed in our return for UoA 1 while the second (introducing those ideas and products into clinical practice) is addressed within this UoA. The principal aim of the IAHS is *to improve health and health care delivery through excellence in applied health sciences research and translation of that research into practice*. We do this through three research themes: (i) *investigating the determinants and diagnosis of common symptoms and conditions*; (ii) *evaluating health and healthcare interventions*; and (iii) *delivery and organisation of healthcare*. A key element of our work within these themes includes developing improved or new methodology**.** The main areas in which we apply our work are: musculoskeletal pain, reproductive health, renal disease, surgery, urology and nutrition which represent areas of longstanding clinical and population health research strength.

<u>1. Investigating the determinants and diagnosis of common symptoms and conditions</u>

This theme focuses on measuring the prevalence and impact of common symptoms and conditions and in identifying their determinants. We investigate the prognostic value of symptoms (and related biological measurements) with respect to outcome and identify clinically useful and affordable diagnostic approaches. It demonstrates the public health importance of the areas studied and (in relation to other themes) informs trials of management with a view to improving patient care. Examples of work in this theme are:

1.1 The impact, determinants and prognostic value of common symptoms and conditions: We have assessed the impact of chronic pain in the UK and across Europe using large community studies (**Macfarlane-G; Elliott-A).** We made the first observation, subsequently replicated by ourselves and others, that severe chronic pain is associated with all-cause premature mortality and

specifically increased cardiovascular and cancer mortality (**Macfarlane-G**). Studies of mechanisms have revealed this to be partly explained by lifestyle factors such as low levels of physical activity and poor diet. In determining the aetiology of chronic pain, we have conducted the first genome-wide association study of chronic widespread pain (**Jones, Macfarlane-G, Hocking** (returned in UoA1)) providing important leads in terms of understanding its development. The report of pain is strongly related to the report of fatigue and we have demonstrated, using vasculitis as an exemplar, that fatigue has the largest population attributable risk in terms of explaining poor quality of life amongst persons with rheumatic and musculoskeletal disease (**Basu**). **Black**, in our renal research programme**,** reported an individual-patient meta-analysis involving over 2 million persons from general population and high risk cohorts in 33 countries, which demonstrated that although lower thresholds are currently used for women, their risk for end stage renal disease at a given glomerular filtration rate and urinary albumin-creatinine ratio was similar to that in men.

1.2 *Investigating modifiable factors to inform trials of management of common symptoms and conditions:* Our systematic review and epidemiological work has informed trials of management of patients with pain. For example, innovative six month telephone-based cognitive behaviour therapy and community-based exercise programmes have demonstrated sustained improved quality of life for patients with chronic widespread pain in comparison to receiving usual care (**Macfarlane-G**), and the magnitude of improvement is amongst the largest reported. **Bryan** demonstrated that using predictors of outcome to target treatment for patients with back pain resulted in improved outcomes at reduced cost. The "STarT Back" tool resulting from this work is now being used by NHS24 to screen back pain patients and inform decisions on management. Our research in musculoskeletal disorders (conducted together with colleagues returned in UoA1) was internationally recognised by the award of a *European League Against Rheumatism Centre of Research Excellence* status for the period 2010-15. In respiratory disease research we have demonstrated that using "asthma risk registers" in primary care did not reduce treated exacerbations, but reduced hospitalisations and increased prescriptions of recommended preventative therapies without increasing costs (**Price**). Guidelines recommend the use of such registers, but this study was the first to provide evidence on their benefit.

1.3 *Diagnostic approaches to common symptoms:* We have demonstrated, through systematic review and meta analysis, that diagnostic tests for symptoms with a low risk of serious illness do little to reassure patients, decrease their anxiety, or resolve their symptoms, although the tests may reduce further primary care visits **(Burton)**.

2. Evaluating health and healthcare interventions

The underlying philosophy of this theme is the generation of new knowledge to inform healthcare: evidence synthesis (including modelling and economic evaluation) informs new primary research (principally large-scale clinical trials). The theme, primarily conducted within HSRU, HERU and Applied Clinical Sciences, is concerned with the evaluation of non drug technologies and other complex interventions. It incorporates health economic valuation and preference work, including the development and application of contingent valuation (CV) and discrete choice experiments (DCEs).

2.1 Evidence Synthesis: **Mowatt** and **Ramsay** lead a portfolio of health technology assessments (HTAs) and we have received a further five-year extension (to 2016, £2.1m) from the NIHR Technology Assessment Review (TAR) programme – one of 9 teams across the UK providing evidence synthesis capability to the National Institute of Health and Care Excellence (NICE). Since 2008, we have completed 33 evidence syntheses and these have directly supported NHS policy decisions. For example, **Mowatt's** review of Elucigene FH20 and LIPOchip for the diagnosis of familial hypercholesterolemia led to NICE recommending against their use for the confirmation of a clinical diagnosis because greater health benefits could be achieved cost-effectively through the use of comprehensive genetic analysis.

Glazener is co-ordinating editor of the international Cochrane Incontinence Group (contract renewed 2011-6). Work in the fields of pelvic floor dysfunction and urology has included reviews

on photodynamic diagnosis and urine biomarkers for the detection and follow-up of bladder cancer (**Mowatt**), alternative approaches to endoscopic ablation for benign enlargement of the prostate (**N'Dow)** and surgical management of pelvic floor prolapse (**Glazener**). The last review was the most cited in the Cochrane Library in 2012. The same rigorous methodological approaches have been used to evaluate nutritional interventions. This has included a meta-analysis of calcium supplements and cardiovascular events, which was the second most read research article in the BMJ in 2012, and a systematic review of vitamin D and vitamin D analogues for preventing post-menopausal fracture (both **Avenell**).

2.2 Large scale randomised trials: The design and conduct of large randomised trials of healthcare interventions is a central component of our research portfolio. This activity is co-ordinated primarily from the Centre for Healthcare Randomised Trials (CHaRT) led by **Norrie**. Within CHaRT we have a mature programme of research in randomised controlled trials of non-drug technologies (currently 27 trials, value £40.4m). Significant contributions since 2008 include: the first outputs from our 2300-patient multi-centre trial of different approaches to the surgical management of knee replacement -the largest trial ever undertaken in the field (**Campbell**); a multicentre trial comparing laparoscopic surgery with optimised medical management for gastro-oesophageal reflux disease (**Ramsay**), peeling versus no peeling for idiopathic full thickness macular hole eye disease (**Norrie**) and different approaches to endometrial ablation for heavy menstrual bleeding (**Cook**). **Glazener** and **N'Dow's** portfolio of trials on pelvic floor dysfunction and urological problems include the 7000-patient trial of different catheter types reported in the Lancet and the multicentre trial of the management of men after prostate surgery (**Glazener**), which was awarded best clinical abstract at the International Continence Society in 2010. **Avenell** leads the portfolio of obesity and other nutritional interventions trials including the MRC SIGNET trial which assessed the role of glutamine and selenium for critically ill patients (**Avenell**). Long-term follow up of the MRC RECORD trial of vitamin D and calcium for secondary fracture prevention was also completed and was awarded the 2012 Endocrine Society International Award for Publishing Excellence. An MRC and NHS-funded trial (the 5000-patient TOMBOLA trial) set up to determine the most appropriate way to manage low grade cervical cytology results (**Cotton** and **Gray**) has resulted in changes to clinical practice. For example, women attending for a colposcopy are now told more about the after-effects they may experience. In addition, the current expert review group for the Scottish Cervical Screening Programme and the latest NHS cervical screening guidelines have been informed by this research.

We use major observational studies, where appropriate, to evaluate healthcare interventions. One example is the 45 year Royal College of General Practitioners Oral Contraception Study which evaluates long-term safety and researches other issues of relevance to women's health **(Hannaford)**

2.3 Methodological development: Our research work is underpinned by extensive methodological research informing the development and refinement of innovative solutions to research problems and ensuring that our research is undertaken using the most up-to-date and appropriate methods available.

With respect to the design and conduct of trials, our work has included research on placebo surgery (**Skea**), strategies for maximising recruitment to trials (**Cook**), and the development of a new measure on beliefs about surgery (**Ramsay**). Extensive methodological work on evaluation of surgical interventions (**Cook**) formed a series of papers in the Lancet in 2010 and **Campbell**'s research into the reporting of cluster randomised trials resulted in production of a revised international CONSORT Statement for cluster randomised trials in 2012. Our medical statistics group has focussed on the handling of missing data in RCTs, for example, comparing imputation methodologies (**Fielding**). The methods portfolio is augmented by the successful award of a number of prestigious fellowships, including the award of an MRC Methodology Fellowship to **Cook** to explore the place of expertise-based trials designs.

HERU continues to be at the forefront of research into the development and application of valuation methods within health economics. **Van der Pol** leads research on time preference rates

for health which informs discounting practices in cost-effectiveness analyses and improves understanding of health behaviours, thereby contributing to the development of effective interventions. Research has focused on key methodological issues including: testing the underlying axioms of utility theory (**Watson**); validity of contingent valuation and discrete choice experiments (**Watson**, **McNamee**, **van der Pol**); and issues raised in the econometric analysis of survey response data (**Ryan**). A new empirical test was proposed to understand better the relationship between two widely used quality-of-life measures (**McNamee**) and risk aversion for health was explored to inform estimates from standard gamble, a commonly used method to elicit quality of life (**van der Pol**). New research has also been conducted examining the robustness of health state valuation methods for process of care preferences and the development of novel statistical modelling to minimise bias **(McNamee)**.

3. Delivery and organisation of care

Research in the Delivery and Organisation of Care theme evaluates how health services should be delivered by individuals, health providers and healthcare organisations.

3.1 Workforce Issues: This part of the theme brings the theoretical concepts and empirical techniques of labour economics to the analysis of health service labour markets and organisations. Building on the theory of wage compensation, research was conducted into the consequences of geographical wage variation and NHS wage-setting for the recruitment and retention of doctors and nurses (**Elliott-R).** Research, drawing on **Elliott-R's** expertise in labour markets, has resulted in new formulae for distributing resource within primary care in England.

3.2 Service delivery: Building on our successful track record in the evaluation of clinical interventions and long-standing expertise in researching health professional behaviour we have developed a substantive portfolio of research in the theory and evaluation of alternative models of service delivery. This work links to the Business School with leadership provided through the joint appointment of **McKee** (returned in UoA 19), who is deputy chair of the commissioned workstream of the NIHR Health Services & Delivery Research Commissioning Board programme. Research into service delivery models has included the multi-centre evaluation of a nurse-led, intensive care follow-up clinic (**Campbell**) and assessment of different surveillance regimens after the treatment of primary breast cancer (**Hernandez**). Exploration of theoretical factors affecting the uptake of evidence based practice has also been influential. Examples include factors affecting the placement of denture fissure sealants and the use of lumbar spine x-ray in primary care. We ensure that methodological developments are applied at the policy level. A pioneering application of the DCE technique is its use to estimate the value of informal care in the UK (**Ryan**). Other applications include the use of DCEs to derive utility weights for quality adjusted life years (QALYs) (**Ryan**) and preferences for alternative models of intra-partum care in remote and rural areas of Scotland (**Watson**).

Future plans, building research capacity and sustainability

Applied Health Sciences is a priority area for sustained investment over the longer term within the University of Aberdeen. Its focus aligns with one of the primary strands of the University's strategic plan (the interdisciplinary theme "Pathways to a Healthy Life") highlighting its centrality to the overall research direction of the University. Four key principles underpin our future research strategy i) building on areas of research strength, ii) making a difference to patients, professionals and policy makers, iii) conducting, where appropriate, multi-professional and multidisciplinary research; and iv) building capacity and sustainability. We believe that a great part of our success to date has been the result of our strategic focus on niche areas of strength and delivering high quality research and innovation in those fields. Building on these principles, each theme has clear objectives for the next five years.

Determinants and diagnosis of common symptoms and conditions

Firstly, we will focus on e-health. HEADLINES is a research network which brings together researchers from the IAHS and NHS Grampian to optimise the secondary use of health data in research, linking data within and outwith the NHS to improve healthcare. Scotland has unique NHS datasets (Scottish Morbidity Records) and Aberdeen in particular benefits from the existence of internationally-recognised historical cohorts (e.g. Aberdeen Children of the 50s study (AC50), the Aberdeen Maternal and Neonatal Databank). Aberdeen is a full partner in a Scotland-wide consortium which was awarded an MRC e-health centre of research excellence in 2012 (Aberdeen lead, **Hannaford**). Within this consortium, Aberdeen will contribute understanding of: how early life experiences influence health in later life, the safety of medicines, and understanding the impact of interventions to improve health and health service delivery. Our recent appointment of **Myint** with expertise in ageing research will importantly contribute to this work. Examples of projects which will deliver this include: a) linking early life data from the AC50 with medical records and the collection of new imaging data to understand the influences on cognitive decline and b) a Chief Scientist's Office (CSO) training fellowship (awarded to **McLernon**) developing a clinical prediction model to estimate the chances of pregnancy among sub-fertile women. The latter uses national databases to generate a model which will be externally validated using international data resulting in development of a clinical prediction tool to facilitate management of infertility. Secondly, building on our long-standing expertise in the evaluation of healthcare interventions, we will develop our growing expertise associated with reviews and evaluations of diagnostic tests. This is an emerging area with the potential for further substantive development. Thirdly, we will continue to focus our population-health work on addressing modifiable factors to inform the design of trials to evaluate interventions for common symptoms, specifically pain. For example, using therapies which we have demonstrated improve long-term outcome for chronic pain, such as exercise and behavioural therapies, we will test whether they can also prevent onset. We will focus on optimal management at the time of symptom onset (e.g. determining how to advise patients about exercise while waiting for physiotherapy for arm pain: **Jones, Macfarlane-G**, **McNamee,** Arthritis Research UK, £533k). Fourthly, with the move of the Rowett Institute of Nutrition and Health (RINH) adjacent to the IAHS in 2014, public health nutrition research (**McNeill, Kyle, Craig**) will be able to take greater advantage of the facilities of the RINH Human Nutrition Unit to carry out diet intervention studies. They will also benefit from expertise of RINH staff in emerging research areas such as epigenetics, biomarkers of nutrient intake, links between environment, nutrition and health, analysis of consumer food purchase data and social determinants of food choice. Several new areas of research e.g. the influence of marketing of foods high in fat, sugar and salt to young people; consumer responses to advice on sustainable healthy diets and the role of diet in resilience to ageing have been prioritised.

Evaluating health and healthcare interventions

The delivery of high-quality evidence syntheses and large-scale randomised controlled trials remains a top priority. We have successfully applied for many new large-scale grants, and the infrastructure is in place for long-term sustainability of this theme. For example, we were successful in extending our £2.1m contract to deliver high-quality evidence synthesis for NICE to 2016, our co-ordination of the Cochrane Incontinence Group has been extended to 2016, and we were successful in our 2012 application to have CHaRT (our clinical trials unit) awarded its second phase of full registration by the UK Clinical Research Network. We will continue to focus and develop niche areas, particularly in the evaluation of non-drug technologies and complex interventions. Examples include new multicentre trials of lithotripsy for the management of ureteric stones (£1.4m, NIHR HTA programme), and different surgical approaches for the management of vault and uterine prolapse (£1.4m, NIHR HTA programme). Building on strong links with our health psychology group, and the recent arrival of the new, internationally-recruited, chair (**de Bruin,** re-locating from the University of Amsterdam), we will further develop strength in the development and evaluation of behavioural interventions. For example, we are key partners in a recently awarded programme of work to develop and evaluate enhanced audit and feedback interventions to increase uptake of evidence-based transfusion practice (£1.9m, NIHR programme grant). We will also continue to apply economic theory and methods to improve the understanding of health

behaviours in order to inform the development of effective interventions (e.g. on the economics of food choice, with Scottish Government funding).

Methodological innovation will remain a core tenet of this theme. Recruitment and retention in trials will be a focus. This programme of research is being advanced through applications for direct funding – for example an application is currently under consideration by the MRC focussing on the informed consent process – and through strategic alliances with the UK MRC Hubs for Trials Methodology Research and international methods centres including the Ottawa Methods Centre with whom we have an established programme of research collaboration. We are about to commence a large scale evaluation of the use of decision-aids for recruitment to trials (CSO independent fellowship funded, £165k) and are developing a portfolio of research around incorporating insights from marketing theory into recruitment strategies (with partners in our Business School). We will further develop our capability in mixed-methods research, such that our complex intervention development work can be informed by formal synthesis of qualitative and quantitative approaches. We will continue to conduct novel, leading-edge, research in the area of preference elicitation. Feasibility work is being conducted with the School of Psychology to use novel eye tracking methods to better understand how individuals respond to valuation tasks, and collaborative work is being developed with the Economics department using experimental economic methods to understand how individuals respond to valuation tasks. Building on our strengths in economic evaluation and preference elicitation, the integration of novel valuation methods that take a broader approach to valuation (beyond the QALY) will be explored. We will extend our economic evaluation work to evaluate technologies and services that are already in routine use within the health system, so as to inform decisions relating to technology withdrawal and the efficient redesign of services over time.

Delivery and organisation of care

We will build on our strength in the economics of the health workforce, drawing on theories and techniques from labour and personnel economics to explain changes in workforce design and how these impact on the delivery of health care. Newly funded research (**Elliott-R**, European Commission, €3M) will investigate, in partnership with eight other countries, the impact of new and changing roles for health professionals on health outcomes and health service costs. The impact of quality and access to primary care on health service performance (potentially avoidable hospitalisations) will be explored in comparative research in Scotland and Australia (£187K, Chief Scientist Office and $AUD387K, National Health Medical Research Council, Australia). We will also scale up our activity in the evaluation of alternative models of care delivery, building on our Business School experience in healthcare management and organisational theory and our niche expertise in workforce in HERU. We have developed a multi-centre study to evaluate alternative models of monitoring for glaucoma care (currently under review at the NIHR). We will explore the application and development of new methods to this area – for example we are currently working with computational biologists on the use of optimization algorithms to assess the optimal configuration of a national system of major trauma centres across Scotland (**Campbell**). The strategic professorial appointment of **Entwistle** will also expand and deepen our work in this area. Her research is focused on exploring models of patient-centred care and draws insights from the discipline of philosophy on relational theories of autonomy, and on a “capabilities” approach to quality of life. We have recently been awarded a Health Foundation grant to further this work.

Building and sustaining research capacity: Across the Institute we are:

- Developing research leaders of the future through attracting, developing and retaining academic personnel (see People section)
- Identifying future researchers through our successful Masters programmes in Public Health Research, Global Health and Management, Human Nutrition, Economics of Health and Health Psychology. We will also continue to provide, and strengthen, our short course programmes in health economics, statistics and epidemiology which provide individuals working in the NHS and other national and international organisations with key skills to undertake research.
- Providing an environment where expertise in core disciplines can be sustained but where

multidisciplinary working is facilitated such as through joint appointments of senior staff. Examples include public health nutrition research with RINH; **McKee** (returned UoA 19) with the Business School, **Naga** and **Aoki** (returned UoA 18) with Economics, **Basu** with the Institute of Medical Sciences.

- Enabling multi-disciplinary research whereby the methodological expertise in applied health science links with clinical areas of strength within the University. For example our expertise in the epidemiology of musculoskeletal disorders, combined with our research programme on musculoskeletal disorders in basic and clinical science within the Institute of Medical Sciences and clinical research in NHS Grampian.
- Maintaining a vibrant research environment which attracts PhD students to our "flagship" training programme (see Research Students section).
- Providing strong staff development opportunities through formal staff appraisal, skills training, provision of structured journal clubs, seminars and short courses (e.g. in qualitative research training, epidemiology and dietary assessment methods) and where appropriate to encourage and support staff to undertake a higher degree. In the REF period 31 staff have undertaken PhDs.
- Proactively encouraging staff to seek competitive external fellowships (at early career, intermediate and senior level) with 21 successful applications over the period since 2008
- Continuing to look for opportunities to link with centres of excellence elsewhere in the UK and internationally where these are consistent with our strategy. Examples of these activities include: a) The Scottish School of Public Health Research (http://www.ssphr.ac.uk) which has been funded by the Scottish Funding Council, to create world-class research collaborations in public health across Scotland. **McNeill** leads the theme on obesity which has an active steering group involving policymakers (Scottish Government health department) and practitioners (NHS Health Scotland) and b) formation of "UK Research Groups in Musculoskeletal Epidemiology" (UKRiME) with the Universities of Manchester (lead), Oxford, Bristol, Southampton, East Anglia and Keele which was awarded the Arthritis Research UK Centre of Excellence in Epidemiology (£2.5 million, **Macfarlane-G** Aberdeen lead) and forming a consortium with the Universities of Southampton (lead), Liverpool, Lancaster, Manchester and Keele which has had a bid shortlisted for the MRC/Arthritis Research UK centre to reduce workplace disability from musculoskeletal disorders (Aberdeen investigators: **Macfarlane-G**, **Jones**).

c. People

i. Staffing strategy and staff development: The University's staffing policy focuses on academic excellence. This is achieved by developing and promoting existing staff as well as external appointments. Within the period of REF, the IAHS has consolidated existing areas of methodological or clinical strength with appointments bringing complementary expertise. We have made strategic chair appointments within this REF period in Population Health (**Wilson, Myint**), Health Services Research (**Entwistle, de Bruin**), Health Economics **(Bryan**), appointed **Burton** to Primary Care, and promoted existing staff to chairs in areas of strength (**Avenell, Glazener, McNamee, McNeill, Ramsay, and van der Pol).**

We have particularly strong links with the NHS as exemplified by the number of persons submitted who hold Honorary Consultant Posts (approximately one-third of those returned) and by our commitment to develop NHS staff as clinical researchers (e.g. **Basu** who held an NHS post, was awarded a CSO fellowship and then on completion was appointed as Senior Lecturer). NHS Research Scotland Career Research Fellowships develop and support the next generation of clinical researcher and we currently hold 5 within the IAHS.

The IAHS operates within the Researcher Development Agenda, ensuring that all policies and procedures reflect the principles of the Concordat (UUK/RCUK). All researchers were issued with a copy of the Concordat by the Vice-Principal for Research in 2009 and the responsibilities of researchers and the institution made clear. For more recent appointments, this forms part of the staff induction pack. The University Researcher Development Unit (www.abdn.ac.uk/rsd) provides a range of development opportunities, with an emphasis on Early Career Researchers. An

induction programme is attended by all new researchers and is followed up by longer term support through CPD. Participation in a mentorship programme is available for new academic appointments and is a requirement for all ECRs making application for competitive external fellowships. The aim is to give ECRs maximum support and to ensure that only high quality applications are submitted. Financial support is available to staff and students to support travel (through the Principal's Excellence Fund) and for pump-priming of new research and knowledge transfer activities (through the Principal's Interdisciplinary fund). For more experienced researchers a bespoke principal investigators' (PI) development programme promotes excellence in leadership and management. The University of Aberdeen has been recognised by the European Commission for positive actions to support the career development of researchers and its plans to implement the Concordat. The University is one of 38 institutions in the UK to receive the "HR Excellence in Research" award from the European Commission.

ii. Research students: Over the course of the REF period 127 PhD students have commenced study - 82 PhDs were awarded during this period with an 89% completion rate. Research students are supported by the Graduate School for the College of Life Sciences and Medicine. This enhances the quality of postgraduate training and the academic experience of graduate students. High quality training is provided within a research intensive environment to support the academic professional and personal development of our students and to promote excellence in supervision and teaching. The development of research skills occurs with bespoke training for anticipated needs according to the student's Personal Development Plan, which is discussed regularly between student and supervisors. There are mandatory courses in the initial three month period of study including sessions on scientific conduct, research ethics and governance, project design and monitoring progress. Later, courses are provided on data handling and statistics, scientific writing, presentational skills, entrepreneurship and knowledge exchange. All students have access to funding for specialist courses if not provided locally. Each student has at least two supervisors and an advisor. Supervisors keep records of their meetings with students and there are compulsory reports submitted at six-month intervals which are reviewed by Postgraduate Officers. There is a nine month review with a written report, presentation, and viva with two members of staff. In the second year there is a written report in the form of a manuscript, and poster presentation. In the third year a presentation is made at an annual Postgraduate Symposium. Resulting from a doctoral training award from the MRC with a major focus on health sciences, we have developed a competitive "flagship leadership training programme" open, by competition, to students undertaking PhD study. This programme cultivates strategic thinking and leadership skills through cross-disciplinary activities over and above generic skills training. The programme has workshops, public engagement events and visits involving stakeholders in research (e.g. the public media, NHS, government advisors, policymakers, industry, venture capitalists and entrepreneurs). Novel elements include a two day "Bio-business made simple" course, the commercialisation of research, leadership and management training, team working, 360º feedback, leadership styles and inter-personal skills.

Equality and Diversity: The University is committed to equality for all staff and students and the University Court oversees the Equality and Diversity policy with a vice-principal responsible for its implementation. The University applies the policy to all aspects of employment. This unit's members have access to Equality and Diversity e-training with two modules available: 'Diversity in the Workplace' provides basic training on the legislative framework and its practical implications. It is a requirement to be trained to participate in selection panels. The second module, 'Diversity in Teaching and Learning', focuses on issues relating to teaching practice and about developing an inclusive learning environment. We have established the "Esslemont Group" which promotes equality and diversity and gender balance. The role of women in medicine, science and business is highlighted by profiling local role models who have national and international profiles. In 2011, the University received bronze membership of the Athena SWAN charter, recognising good employment practice for women working in the IAHS and it is preparing a submission for the silver award. The University has achieved Investors in People (IiP) status across the Institution.

d. Income, infrastructure and facilities

Infrastructure: Research and Innovation (R & I) consists of a team of specialist advisors dedicated to maximising the University's research income, identifying intellectual property opportunities and successfully exploiting innovative ideas. R & I are the first point of contact for this unit's researchers applying for funds to undertake research. They provide co-ordination of the College's peer review and (as appropriate) mentoring process for applicants, links to our research governance and finance teams. They ensure that all necessary authorisations are obtained prior to submission of a grant and conduct of the research. A "Framework for Research Governance" has been developed which outlines the principles which underpin the approach to research governance and provides a detail of all key research governance arrangements and obligations of researchers.

The University is committed to public engagement in science and is a Centre of Excellence for Public Engagement supported by the Research Councils UK Catalyst scheme, one of only eight such institutions across the UK. The Public Engagement with Research Unit at the University provides support to staff and students wishing to promote their research, or science generally, to a public audience and we have a dedicated Public Engagement Champion for the College of Life Sciences and Medicine to specifically promote work in our area. Research staff are encouraged to be involved in the public engagement activities of the successful *Café Scientifique*, *Café Med* and *Café Controversial* programmes (www.abdn.ac.uk/science, the largest Cafe discussion series in the UK) and in 2012 the University of Aberdeen hosted the annual British Science Festival. IAHS staff have contributed extensively to these programmes as detailed in the impact environment statement of our REF submission. In terms of involving patients and members of the public in our research, in 2009 the IAHS established a service users group composed of members of the public with a broad interest in health and health services. This was a result of an Economic and Social Research Council Grant (**Macfarlane-G, Jones**) which enabled us to establish a seminar programme for members of the public and subsequently to design a training programme for members of the public interested in joining the group.

Facilities: Members of the Institute are co-located on the Foresterhill Health Complex (FHC) which is a 125-acre site including the School of Medicine and Dentistry of the University and a large range of NHS Grampian clinical facilities. These include Aberdeen's Royal Infirmary, Royal Children's Hospital, Maternity Hospital, Dental Hospital and Primary Care facilities. This unit's researchers are mostly located in the IAHS which is housed in the linked Polwarth and Health Sciences buildings. The latter building also includes a Clinical Research Facility which is suitable for "ambulatory" clinical research such as population-based epidemiological studies and clinical trials. Adjacent to the IAHS buildings are the Institute of Medical Science (IMS), and also the Suttie Centre for Teaching and Learning in Healthcare which was opened in September 2010 and is a collaboration between the University and the NHS. The University and the NHS have invested heavily in the FHC with more than £92 million spent over the last decade. The Rowett Research Institute for Nutrition and Health will move to the FHC in 2015, resulting in co-location of all population and laboratory nutrition research.

e. Collaboration or contribution to the discipline or research base

Indicators of wider influence or contributions to the discipline or research base: **Campbell** is Deputy Chair of NIHR Health Services and Delivery Research Board (2012-, member since 2009). She was awarded NIHR Senior Investigator Status (2009-12) and in 2013 was made a Fellow of the International Society of Clinical Trials, recognising her international contribution to the field (only 5 UK academics have been given this award). **Hannaford** is a member of the WHO Steering Group for evidence-based contraceptive guidelines (since 2004). He was awarded the Royal College of General Practitioners (RCGP) Foundation Council Award in 2010 for services to the RCGP. **Ramsay** is a member of the Cochrane Collaboration Statistical Methods (1998-) and Risk of Bias working groups (2010-) and the NICE diagnostic methods working group (2008-). **Bhattacharya** is a member of the NICE guideline development group: fertility guidelines (2010-12). **Graham** was a member of the WHO Partnership for Maternal, Neonatal and Child Health (2008-

2011). **Macfarlane-G** is a member of Council of the British Pain Society and chair of the committee which organises the society's annual scientific meeting (both 2011-4), a member of the British Society for Rheumatology research committee and a member of the (Heberden) committee (2011-14) which organises its annual scientific meeting and was a member (2008-12) of the European League Against Rheumatism's Scientific Committee.

Participation in the peer-review process (for example, national and international grants committees, editorial boards): We have many staff members on NIHR grant awarding committees: HTA Commissioning Board (**Norrie**, 2008-); Public Health Research (**Ludbrook** 2011-); Programme Grant for Applied Research (**Macfarlane-G** 2010; **van der Pol** 2009-11, **McNamee** 2011-), Clinical Scientist Committee (**Elliott-R** 2010), Health Services Research Speciality Group (**Campbell**, **Elliott-R** 2008-2012). Staff on Research Council or Wellcome Trust grant awarding panels include: **Entwistle**, chair of MRC Methodology Research Fellowships (2010-2); **Campbell,** chair MRC Strategic Skills Fellowship Panel (2008-12), member MRC Centenary Early Career Awards Panel (2012) and MRC Methodology Research Panel (2008-11); **Ryan**, member MRC Strategic Skills Fellowship Panel (2012-) and MRC Methodology Research Panel (2011-); **Elliott-R**, member MRC Early Career Postdoctoral Fellowships in economics of health (2008-10); **Graham**, member Wellcome Trust Global Trials and Public Engagement Funding Committees (2008-10**); McNeill**, member Wellcome Trust Populations and Public Health panel (2010-12) and Indian Council of Medical Research/MRC non-communicable disease panel (2011). **Hannaford**, Cancer Research UK Population Research Grant Committee (2006-8, chair 2009-12). We have contributed to international organisations and grant committees**: Hannaford** chaired a WHO technical consultation on hormonal contraception and HIV infection (2012), is a member of the WHO Reproductive Health Research Project Review Panel (2010-) and is on the Danish Council for Strategic Research Peer Review Panel (2010-) while **Bhattacharya** is a member of the European IVF Monitoring Board Committee of the European Society for Human Reproduction and Embryology (2007-13) and co-chair of the International Federation of Obstetrics and Gynaecology Reproductive Medicine Committee.

Fellowships and relevant awards: **Cook** holds an MRC Methodology Fellowship (2011-14). **Gray** (2010-13) and **McLernon** (2013-16) were awarded CSO Research Fellowships and **Basu** (2009-12) a CSO Clinical Training Fellowship. **Elliott-A** held a Wellcome Trust Research Career Development Fellowship from 2006-9. **Avenell** (2006-10) was awarded a CSO career scientist Fellowship.

Journal editorships: **Entwistle** was editor of Health Expectations (2007-10); Associate journal editorships are held by **Ludbrook** (Health Economics 2011-), **van der Pol** (BMC Medical Research Methodology 2011-), **McNamee** (BMC Medical Research Methodology; Comparative Effectiveness Research, both 2011-), **McNeill** (Public Health Nutrition 2011-12), **Bryan** (Health Economics 2007-), **MacLennan-G, Norrie** (Trials 2013-) and **Wilson** (BMC Family Practice 2012-)

Effective academic collaboration: We are part of a UK consortium of universities funded by the Wellcome Trust linking with the Public Health Foundation of India (PHFI). The consortium aims to develop leadership in research and teaching for public health in India. We are taking the lead, within the consortium, to develop a woman and child health centre for research excellence in India. We are a member of the UK research groups in musculoskeletal epidemiology (UK-RiME) with the Universities of Manchester, Keele, Southampton, Oxford and Bristol to promote collaboration in this area and particular to work together around training musculoskeletal epidemiologists (Aberdeen lead: **Macfarlane-G,** supported by ARUK Centre of Excellence award). In areas where we are investigating rare disorders we have formed collaborations to ensure that we can study sufficient numbers of patients - e.g. in our work on Head and Neck Cancer we are part of the International Head and Neck Cancer Epidemiology (INHANCE) consortium which gives us access to more than 25000 cases and 35000 control patients across 35 studies worldwide, which represents the largest collection of such patients worldwide (Aberdeen lead: **Macfarlane-T**). The IAHS provides an annual *James Petrie fellowship* to allow senior academics from outside the UK to come and spend an extended period in Aberdeen. Since 2008 we have hosted academics from United States, Australia, New Zealand, and Jamaica in addition to hosting a Fullbright scholar and

CSO visiting international fellow from Finland. These visits have forged partnerships to provide additional expertise in developing future research.

Development, with industry and government agencies: **Graham** was seconded (0.2 fte) as an Advisor to the UK Department for International Development (2009-13), was a special advisor to the UK House of Commons International Development Committee on Maternal Health (2007-08) and is a current member of the WHO technical advisory panel on indicators for improving the quality of maternal and newborn care. **Hannaford** is a member of the MHRA Medicines for Women Health Advisory Group (2012-) and has provided expert advice to WHO and the European Medicines Agency. **Elliot-R** is an Independent member of the Low Pay Commission (2007-14) and a member of the Scottish Government's Technical Advisory Groups on Resource Allocation (2008-12) while **Ludbrook** is a member of the Research and Evaluation Subgroup of the Ministerial Working Group on Tobacco control (Scottish Government Health Directorates). **McNeill** was a member of the UK Food Standard Agency on toxicity of chemicals in food, consumer product and the environment (2006-10). **Entwistle** is a member of the Expert Panel on Information Support Materials for NHS Cancer Screening Programmes and a member of the National Health Literacy Action Group of the Scottish Government Health Directorates (both 2012 -). **McNamee** is a member of the Scottish Medicines Consortium (2009-) and **Counsell** was a member of the Scottish Intercollegiate Guideline Network (SIGN) panel for Parkinson's Disease (2007-9). Several staff are members of NICE programme development groups (**Van der Pol** – Tobacco Harm Reduction 2011-13; **Ludbrook** – Alcohol use disorders prevention 08-10; **Ludbrook** - Personal and social health education 2008-10).

Responsiveness to national and international priorities and initiatives: In recognition of its work on maternal and child health, Aberdeen (lead: **Graham**) was one of 14 institutions invited by the UN Secretary General (Ban Ki Moon) to support the new Global Strategy on Women's and Children's Health (2010-15) through evidence generation and translation.