Amsterdam Public Health research institute

APH is a collaboration between: Amsterdam UMC University Medical Centers, VU Vrije Universiteit Amsterdam, University of Amsterdam

APH in 2018

Annual Report

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Amsterdam UMC
University Medical Centers

Amsterdam Public Health
research institute
A collaboration between Amsterdam UMC, VU and UvA

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Preface

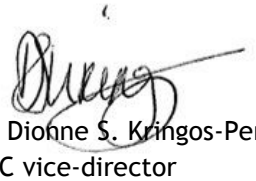
APH is one of the eight multidisciplinary research institutes of the alliance and brings together ~1,500 researchers from departments of different science communities, i.e., from the Amsterdam UMC (VUmc and AMC) and the Vrije Universiteit (VU) Faculty of Behavioural and Movement Science and the Faculty of Science. The APH research institute researches 'Public Health' issues with immediate relevance for the societal challenges facing large metropolitan area's in a globalizing world. These include the shifts of health care from the national to the municipal level and from in-hospital to extramural care settings.

We present the annual report with figures from VU and VUmc, and were possible AMC figures. AMC figures could not always be obtained from the information systems. The overarching story in this annual report does, however, relate to the entire institute. In this annual report we look back on 2018, which represented a very fruitful year of the research institute, in every sense. You will find the information in this report organized along the lines of the SEP.

Yours sincerely, on behalf of the Amsterdam Public Health research institute,

Prof. Martine C. de Bruijne
VUmc director

Prof. Carlo Schuengel
VU vice-director



dr. Dionne S. Kringos-Pereira Martins
AMC vice-director

1. Research Area

1.1 Mission and Vision

The APH research institute **mission** is to conduct high quality research to improve citizen health, reduce health inequalities, transform healthcare, and empower citizens.

Health and healthcare are undergoing major transformations with rapidly changing expectations of citizens. The APH research institute will generate, disseminate, and translate knowledge, based on sound research to:

1. help decision-makers at all levels to assess health needs, create a healthy environment, strengthen the healthcare system and safeguard its sustainability,
2. assist healthcare professionals in maintaining and improving their performance, and
3. empower patients and citizens in managing their health.

The APH research institute researches 'Public Health' issues with immediate relevance for the societal challenges facing large metropolitan area's in a globalizing world. These include the shifts of health care from the national to the municipal level and from in-hospital to extramural care settings.

The APH research institute **vision** is to become a European center of excellence for generating knowledge on contemporary issues in primary care and public health settings through multi- and interdisciplinary research on risk and protective factors, on effective prevention and intervention, and on policies and practice. We envision to be ranked among the major European institutes of Public Health.

1.2 APH core values

- We feel a strong personal engagement in advancing the health of all citizens, respecting social, ethnic and cultural diversity.
- We aim for excellence, openness, and integrity in everything we do.
- We base our scientific efforts on their clinical and societal relevance.
- We are a responsible and competent partner in innovation and capacity building with public health practitioners, healthcare professionals, policy makers, and communities in our environment.

1.3 Research programs

The APH research institute concentrates its research efforts in these eight research programs that are well-aligned with the Dutch National Science Agenda. In these programs, around 1,400 researchers are brought together in total with around 500 PhD students. The research programs can be found in more detail on our website:

- Health Behavior & Chronic Diseases
- Mental Health
- Societal Participation & Health
- Global Health
- Aging & Later Life
- Quality of Care
- Personalized Medicine
- Methodology

1.4 Organization

Figure 2 outlines the organization of the APH research institute. In 2017 the **APH Management** consists of two **Directors**, one from both UMCs. Together with the directors of the other research institutes, **Management** takes part in the future UMCA **Research Board.** The Research Board will meet every 4 weeks in the first two years and later bi-monthly to align the policy of all UMCA research institutes and to shape the UMCA research policy on issues that transcend a single institute. This may include ethics review, PI score methodology, criteria for full professorships, research output registration, large scale research infrastructure, and financial project control (quarterly). The UMCA dean meets and chairs the UMCA Research Board quarterly. Annually, a strategy day is held between Research Board and UMCA Board, head of departments and Division Boards. Annually a half-day strategy meeting is held with UMCA board and Division Boards. Bi-annually, the Research Board meets with young talent.

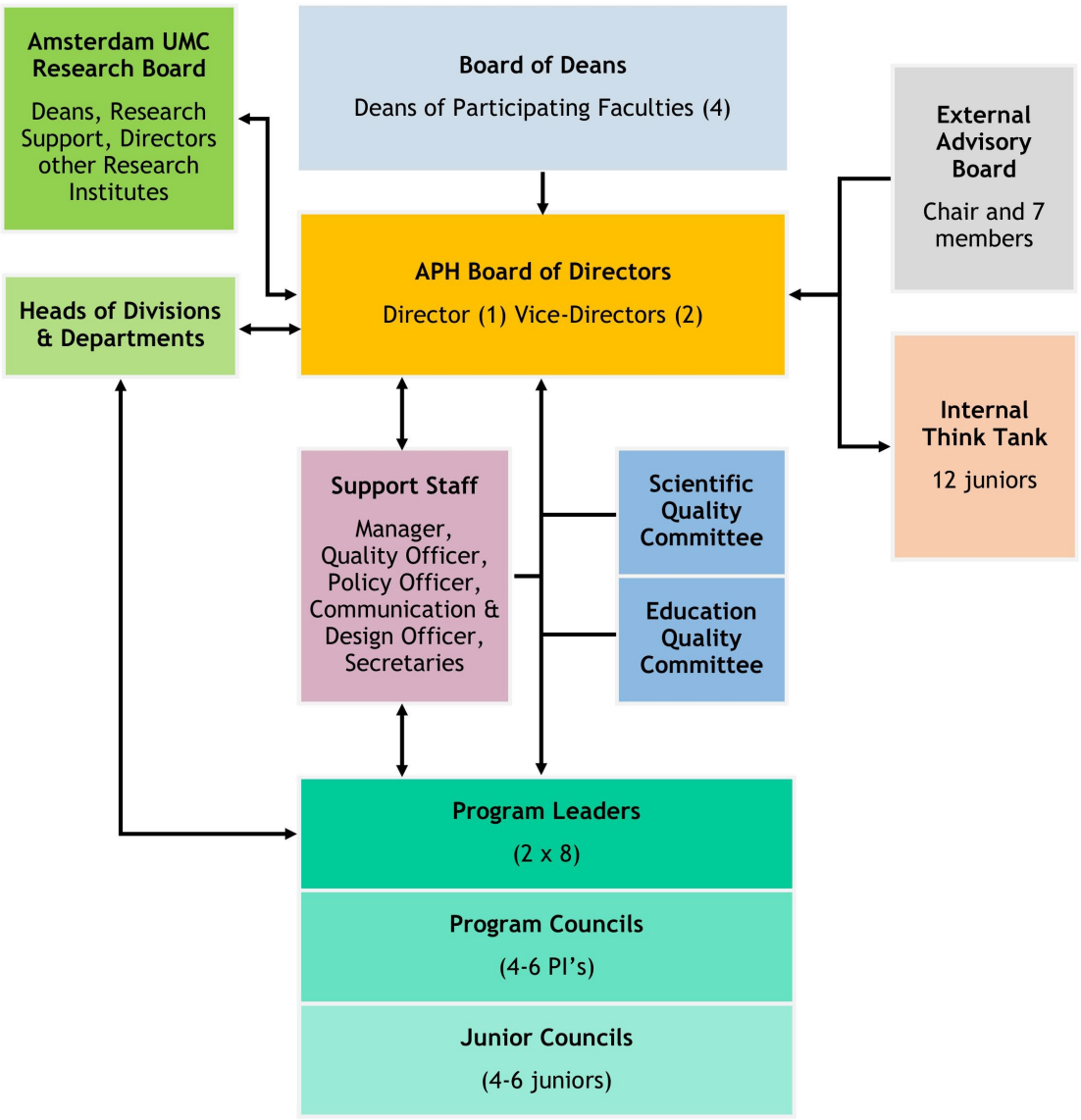


Figure 1 - Organization of the APH research institute in 2018

The **Board of Deans** of the participating VU/UvA Faculties and the UMCA acts as the main supervisory organ of the Amsterdam Public Health research institute. Annually, a meeting with APH Management is used to discuss and approve the annual work plan and deliverables and the use of budget. The Board of Deans, chaired by the UMCA dean, appoints the Directors.

There are eight thematic **Research Programs**. **Program leaders** (two per program till the end of 2019) coordinate the APH activities in their program. **Management** meets monthly with the 16 **Program Leaders** to update the internal strategy and to discuss anticipatory or reactive response to external events. Actions flowing forth from this and the daily operation of the institute are delegated to the **Directors** and **Support Staff.** Support staff is appointed by the Directors. The Program Leaders chair their **Program Council** with 4-6 PIs at minimum within the program.

Each **Program Council** consist of a selection of PI's in the program, appointed by the Program Leaders and meet at least bi-annually to implement or update the program specific strategy and to discuss anticipatory or reactive response to external events; daily business of the program is delegated to the APH Support Staff and program specific administrative support.

The Directors may meet periodically with the **Heads of the Divisions** that collaborate with more than four departments in the Amsterdam Public Health Institute. This ensures a good alignment of the mission of the research institute with the hierarchical organization of the UMCA and the Universities, in terms of research resource allocation. The meetings will address the mission, vision and policy of the institute and will address criteria for admittance and total the researchers that participate in the institute on behalf of the departments.

Management meets quarterly with two APH **Committees**: the **Science Quality Committee** and the **PhD committee**. The **Scientific Quality Committee** discusses and, with the help of reviewers, judges all project proposals and consists of a mix of midcareer and senior scientists representing APH scientific and methodological expertise. The quality officer chairs the Scientific Quality Committee. Their role is to introduce all APH researchers to the quality guidelines laid down in the APH quality handbook, to advise on policies regarding scientific quality and integrity, and to perform yearly audits of research projects. The **PhD/PD Committee** organizes the introductory day for PhD students, maintains an intervision system for PhDs, and reviews the PhD training- and education plans. It also produces a PhD handbook with tips and tricks, including the 'Finish your PhD' manual to guide students through the final six months of their PhD project.

A **Think Tank** of younger Public Health researchers acts as a sounding board and a 'future forum' for Management. They will advise on policy decisions bi-annually and can also provide unsolicited input at any time.

The **External Advisory Board** consists of external members with a senior position in the 'Public Health' field and its institutions (table 1). They meet with Management bi-annually and can provide unsolicited advice at any time.

Table 1 - External Advisory Board of the APH research institute in 2018

Name	Affiliation and function
Drs. A.M.P. (Annemiek) van Bolhuis	Director Public Health and Health Services at the National Institute for Public Health and the Environment (RIVM)
Prof. R.C.M.E. (Rutger) Engels	Chair of the Advisory Board of Trimbos Institute
Prof. L.J. (Louise) Gunning-Schepers	Chair of the Dutch National Science Agenda (NWA)
Drs. A. (Aad) Koster	Chair of the Organisatie voor Vitaliteit, Activering en Loopbaan (OVAL)
Prof. J.A. (André) Knottnerus	Chair of the Scientific Council for Government Policy (WRR); Professor of General Practice at Maastricht University
Dr. H.P. (Petrien) Uniken-Venema	Director of the Netherlands School of Public and Occupational Health (NSPOH)
Drs. D.A. (Dianda) Veldman	Director of Patiëntenfederatie Nederland
Drs. P. (Paul) van der Velpen (chair)	Director of the Public Health Service of Amsterdam (GGD Amsterdam)

The multidisciplinary nature of the APH research institute is amply illustrated by the diversity of the participating departments listed in table 2.

Table 2 - Departments participating in the APH research institute in 2018

	Departments	Head of Department (in 2018)	Research staff (in numbers) 2018
VU FB	Health Sciences	Maurits van Tulder	76
VU FB	Athena Institute	Jacqueline Broerse	31
VU FGB	Biological Psychology	Eco de Geus	17
VU FGB	Clinical, Neuro- & Developmental Psychology	Pim Cuijpers	68
VU FGB	Clinical Child & Family Studies	Carlo Schuengel	18
		Total VU	**210**
VUmc	Clinical Genetics (incl. Community Genetics)	Hanne Meijers-Heijboer	5
VUmc	Clinical Pharmacology & Pharmacy	Noortje Swart	2
VUmc	Dermatology	Rick Hoekzema	2
VUmc	Epidemiology & Biostatistics	Hans Berkhof	53
VUmc	General Practice & Elderly Care Medicine	Henriëtte van der Horst	48
VUmc	Internal Medicine (incl. Endocrinology; Nutrition and Dietetics)	Mark Kramer	14
VUmc	Medical Humanities	Guy Widdershoven	29
VUmc	Medical Psychology	Frank Snoek	11
VUmc	Midwifery Science	Anke de jonge	10
VUmc	Obstetrics & Gynaecology	Christianne de Groot	5
VUmc	Ophthalmology	Stevie Tan	7

VUmc	Otolaryngology / Head & Neck Surgery	René Leemans	20
VUmc	Pediatrics (incl. Child & Adolescent Psychiatry)	Hans van Goudoever	21
VUmc	Plastic, Reconstructive and Hand Surgery	Mark-Bram Bouman	4
VUmc	Psychiatry - GGZ inGeest	Aartjan Beekman	100
VUmc	Public & Occupational Health	Allard van der Beek	93
VUmc	Rehabilitation Medicine	Vincent de Groot	13
VUmc	Pulmonary Medicine	Anton Vonk Noordegraaf	1
VUmc	Medical Oncology	Mariette Labots (a.i.)	1
VUmc	Nephrology	Frans van Ittersum	1
VUmc	Rheumatology	Ronald van Vollenhoven	1
		Total VUmc	**441**
UvA	Communication Sciences	Martine van Selm	19
		Total UvA	**19**
AMC	Anesthesiology	Wolfgang Schlack	21
AMC	Cardiology	Arthur Wilde	3
AMC	Center for Reproductive Medicine	Sjoerd Repping	4
AMC	Center for Experimental and Molecular Medicine	Jan Paul Medema	1
AMC	Child Psychiatry	Ramón Lindauer	1
AMC	Clinical Epidemiology, Biostatistics and Bioinformatics	Koos Zwinderman	22
AMC	Coronel Institute of Occupational Health	Carel Hulshof	23
AMC	Dermatology	Menno de Rie	7
AMC	Ear, Nose and Throat	Freek Dikkers	11
AMC	Experimental Immunology	Theo Geijtenbeek	5
AMC	General Practice/Family Medicine	Henk van Weert	44
AMC	Global Health	Frank Cobelens	11
AMC	Internal Medicine	Jan Prins	29
AMC	Medical Informatics	Ameen Abu-Hanna	25
AMC	Medical Microbiology	unknown	4
AMC	Medical Psychology	Frank Snoek	20
AMC	Neurology	Yvo Roos	4
AMC	Obstetrics and Gynaecology	Christianne de Groot	22
AMC	Orthopaedic Surgery	Gino Kerkhoffs	12
AMC	Paediatrics	Hans van Goudoever	33
AMC	Pathology	Marc van de Vijver	6
AMC	Plastic, Reconstructive and Hand Surgery	Chantal van der Horst	2
AMC	Psychiatry	Damiaan Denys	15
AMC	Public Health	Anton Kunst	35
AMC	Pulmonology	Anton Vonk Noordegraaf	6
AMC	Radiology and Nuclear Medicine	Jaap Stoker	6
AMC	Rehabilitation	Frans Nollet	3
AMC	Surgery	Dink Legemate	6
AMC	Urology	Harrie Beerlage	13

AMC	Gastroenterology and Hepatology	Paul Fockens	1
AMC	Medical Biology	Roelof-Jan Oostra	1
AMC	Ophthalmology	Freek Dikkers	1
		Total AMC	**397**
		Total Amsterdam UMC, VU & UvA	**1067**

At the VU University the largest contribution comes from the Health Sciences and Clinical Psychology departments. At the VU University Medical Center Public and Occupational Health, Psychiatry, General Practice & Elderly Care Medicine, and Epidemiology and Biostatistics are the largest departments, a comparable representation is observed at the Amsterdam Medical Center with General Practice/Family Medicine, Public Health as the largest departments. These departments are the largest contributors in keeping with the extramural roots of the institute. There is also a good contribution from a diversity of clinical departments (e.g., Otolaryngology, Head & Neck Surgery, Internal Medicine, Pediatrics) reflecting the importance of clinical evaluation research and evidence-based practice in trans- and intramural research.

2. Composition

The total number of scientific personnel in 2018 was 1380 individuals amounting. The Amsterdam Medical Center is the largest contributor (721 researchers), followed by the VU University Medical Center with 446 researchers, and the Vrije Universiteit Amsterdam (213). The break down per job category is provided in table 3. Scientific core staff includes full professors, associate professors, assistant professors, professor emeritus, endowed professor. Other scientific staff includes senior researchers, postdocs, junior researchers, visiting fellows. PhD students consist of standard PhDs (employed) and adjunct PhDs (externally or internally funded, but not employed).

Table 3 (SEP D3a) - Total number of researchers for the institute (VU/VUmc/AMC) and per program*

	Total	HB&CD	MH	SP&H	GH	A&LL	QoC	PM	Me
Scientific core staff	262	59	22	48	84	51	40	78	22
PhD students**	609	118	102	94	149	121	129	201	39
Other scientific staff	509	117	43	91	112	49	77	158	47
Total research staff	**1380**	**294**	**167**	**233**	**345**	**221**	**246**	**437**	**108**

** since 2018 FTE information is no longer registered at the departments, therefore the information displayed in 2018 for the institute and per program concerns the amount of researchers rather than research FTE.*

The current list of APH researchers can be found here VU and VUmc and AMC. To unambiguously define APH researchers the following definitions were used throughout, in accordance with the VU University guidelines:

- an *APH researcher* is any tenured or non-tenured academic personnel who
  - has been listed as part of APOH by one of the department heads in table 2, or
  - takes part in an APH project, where
- an *APH project* is any project that has been reviewed by the Scientific Quality Committee and has been positively judged to fit the APH research programs *and* to be of sufficient scientific and methodological quality.

2.1 Selection of Participants

The above-mentioned definitions also determine how researchers are selected to be part of the APH research institute. Selection is primarily based on the department to which the individual belongs, where the individual must also be participating in one or more projects approved by the Scientific Quality Committee in the past three years. The selection of APH departments is done by the APH Management, in close consultation with the Management Committee. APH departments are carried forward from the previous year, provided they keep meeting the criteria used to admit new departments. New departments can apply for APH membership if the bulk of their research falls in one or more of the research themes of the eight programs and if they have a good track record in publishing and fund raising. A good track record is defined relative to the average APH performance, using a minimum of 75% of the average over the past two years as a guideline. The APH Management decides whether the research of the department fits the APH themes after seeking the advice of the program directors. New departments can obtain an affiliate membership status for two years (after which full

membership is considered applying the above criteria). During this period input and output of the affiliated departments are not yet incorporated in the tables of this annual report.

2.2 Financial Input

Table 4 provides an overview of the various sources for financing the research personnel in the APH research institute (VU/VUmc) from 2012-2017. As a result of the harmonization of certain registration systems and procedures in the merger between both locations of Amsterdam UMC, this information is unfortunately not available for 2018.

Table 4 (SEP D3c) – Sources of funding of the research staff for the institute (APH-VU/VUmc) in 2012-2017 and per program in 2017 (in FTE's)

APH	2012	2013	2014	2015	2016	2017	2017 (%)
Direct funding	**74,6**	**79,3**	**81,5**	**90,4**	**87,9**	**84,3**	**32%**
Research staff: Research grants (RG)	81,6	83,1	92,0	87,3	72,1	54,7	21%
Research staff: Contract research (CR)	137,3	148,1	131,3	149,6	169,0	120,8	45%
Research staff: Other funding (OF)	5,3	4,3	6,4	4,7	3,6	6,9	3%
External funding (total RG+CR+OF)	**224,1**	**235,5**	**229,8**	**241,6**	**244,7**	**182,4**	**68%**
Total internal + external	**298,73**	**314,79**	**311,27**	**331,94**	**332,60**	**266,7**	**100%**

Abbreviations: RG = research grants, CR = contract research, OF = other funding

APH program	HB&CD	MH	SP&H	GH	A&LL	QoC	PM	Me
Direct funding	14,0	32,7	6,1	0,8	5,5	6,7	13,7	4,9
Research staff: Research grants (RG)	6,0	29,3	1,3	0,5	3,3	4,7	7,2	1,1
Research staff: Contract research (CR)	24,2	28,6	7,1	8,4	5,9	20,5	23,3	2,7
Research staff: Other funding (OF)	2,0	2,6	0,4	0,0	1,2	0,1	0,7	0,0
External funding (total RG+CR+OF)	**32,2**	**60,6**	**8,8**	**8,9**	**10,4**	**25,3**	**31,2**	**3,8**
Total internal + external	46,1	93,3	14,9	9,7	15,8	32,0	44,9	8,7

Abbreviations: RG = research grants, CR = contract research, OF = other funding

3. Research Environment and Embedding

A major driver for research in the APH research institute is to have an impact on daily health care practice and policy. For this we maintain a large number of Academic Collaborative Centers with health care providers, government bodies in public health at different levels (municipal, provincial, national), insurance companies, and other stakeholder organizations. An academic collaborative center is a formal collaboration between APH and a practice setting to conduct practice-based research of strong methodological rigor. In these collaborative centers, practice, research, education and policy are brought together by direct collaboration between clinicians, teachers, researchers and managers. For a large part, funding for the research done within the academic collaborative centers comes from the societal stakeholders themselves (e.g., from companies, occupational health services health care institutions, et cetera).

A second major source of national collaboration are joint projects with (semi-) governmental applied research institutes (e.g. Netherlands Organization for Applied Scientific Research -TNO, National Institute for Public Health and the Environment –RIVM, National College of Health Insurance, Netherlands Institute For Health Services Research –NIVEL, Trimbos Institute Utrecht, and the Dutch Healthcare Institute).

To link APH to these non-university based societal stakeholders in health care research or in applied research institutes we often employ professorships by special appointment. There are 63 professors by special appointment active in the APH research institute, usually on the basis of a 0.2 FTE appointment. A full list of professors by special appointment is provided in appendix 1.

4. Quality and Scientific Relevance

Although not perfect, journal impact factors provide an international benchmark to test the quality of the scientific output of the institute. In 2017 a new research information system was introduced at both the VU University, VU University Medical Center and Amsterdam Medical Center. As a consequence the APH-VU/VUmc/AMC publications are currently registered in separate databases while a merge option is not yet available. Therefore the impact percentages in table 5 are split into a VU, VUmc and AMC score. In this table we have to keep in mind that due to the highly collaborative nature of our institute there will be a number of publications duplicated in this table, because they belong to both VU, VUmc or AMC. The numbers presented are based on the relative impact factors of all journals in which we publish using Thomson Reuter's journal citation reports (JCR) table. This table assigns all journals to a number of domains and computes the relative ranking of the journal within its own domain. All APH-VU/VUmc/AMC publications were then classified to a quartile, based on the impact factor of the journal in its respective domain. We then counted the number of publications in the top 25% (first quartile) for the entire institute and each of the eight programs, divided into a VU, VUmc and AMC share. As shown in table 5, more than 56% of both the APH VUmc and APH AMC publications are published in the top 25% journals based on their impact factor in their own domain. For the APH VU publications it concerns more than 41%.

Table 5 - Number and proportion of publications in top 25% journals in the relevant research field, for the institute and per research program divided between VUmc, AMC and VU

	Total	HB&CD	MH	SP&H	GH	A&LL	QoC	PM	Meth
VUmc	538	119	228	53	2	150	155	30	73
	56,51%	55,35%	60,48%	49,07%	66,67%	59,52%	53,82%	44,78%	55,73%
AMC	817	76	103	39	139	154	229	219	202
	60,03%	52,41%	68,67%	55,71%	57,44	57,25%	54,92%	58,09%	59,41%
VU	177	61	140	10	49	11	10	35	65
	41,36%	46,92%	46,51%	31,25%	36,57%	31,43%	25,64%	54,69%	55,56%

4.1 Quality Control

The APH research institute has a number of institute specific resources that strongly facilitate scientific integrity and scientific quality in all phases of research, including study design, data collection, data analysis and reporting. The APH research institute attaches much importance to providing an environment that encourages good conduct in research and discourages misconduct, and to providing tools that maximize high quality research.

4.1.1 Scientific Quality Committee

The Scientific Quality Committee advises the APH Management on the quality and feasibility of all research proposals that have been submitted to the APH Management for formal inclusion in one of the APH research programs. The committee also gives solicited and unsolicited advice to the Executive Board on all matters concerning research policy, and prioritizes awards and (travel) grant proposals funded by the institute itself. The Scientific Quality Committee is a representative reflection of midcareer and senior scientists in the institute with at least two members from each of the eight APH research programs.

After a check for completeness regarding all requirements (e.g., analysis plan, planning, personnel), the proposal is sent to the appropriate program directors to evaluate the proposal on its relevance to the APH mission and its fit within the program's scientific mission. When both criteria are met, the scientific quality of the proposal is assessed by the Scientific Quality Committee. If the proposal has been funded by a peer reviewed grant organization such as ZonMw and KWF, it will be globally assessed by one member of the Scientific Quality Committee. All other proposals will be extensively reviewed by one member of the Scientific Quality Committee and one senior researcher within APH. The reviewers assess the theoretical soundness of the research questions, the methodological quality and the feasibility of the proposal. The reviewers are requested to return the proposal with their recommendation to the Scientific Quality Committee within two weeks.

The Scientific Quality Committee sends its advice to the APH Management that makes a final decision regarding approval of research proposals. Only after approval of the APH Management, the research project described in the proposal will be embedded within APH. In addition, approval of the APH Scientific Quality Committee is required before a proposal is submitted to the Medical Ethical Committee of the VU University Medical Center.

A full list of discussed protocols in 2018 is presented in appendix 2. In total, 122 research protocols were submitted for embedding/review of which 120 were approved at the end of 2018.

The Scientific Quality Committee is also responsible for developing, implementing and maintaining a system for quality improvement and control for the institute. The system is aimed at supporting and improving the research process. Moreover, the Quality Committee advises the Executive Board on quality issues. To fulfill its tasks the Quality Committee audits research projects, maintains and expands a web-based quality manual (www.emgo.nl/kc) and provides personal introductions to newly appointed researchers within the institute.

The quality officer also acts as the principal investigator of potential violations of research integrity brought to the attention of the Executive Board. The officer will suggest (and help implement) a course of action to correct such incidents.

4.1.2 Education quality Committee

The Education Quality Committee aims to support, educate and guide the next generation of public health researchers, i.e. PhD candidates and postdocs. The committee consists of senior researchers, postdocs and PhD candidates representing each of the 8 APH research programs. The committee is chaired by 2 senior researchers from the AMC and VU-VUmc. The committee meets 4 times a year.

The core activities of the APH PhD/PD Committee are:

1. advise the APH board about training, education, supervision and talent policy;
2. create competence (skills) profiles for PhD candidates and postdocs and design a strategy for implementation;
3. organize meetings to introduce the APH institute to new PhD and postdoc members;
4. set up an APH PhD and postdoc network to connect and support PhD students and postdocs in the institute, and to stay in contact with APH alumni.

Within VU/VUmc the PhD Committee is responsible for reviewing the 'education and supervision agreement' that is agreed upon and signed by the PhD student and supervisors at the beginning of each PhD project. Within AMC this task is assigned to the central Graduate School. This agreement lists the obligatory and individually selected courses that the student must complete alongside the PhD research project for an amount of at least 30 ECTS. The overall aim of the agreement is to ensure a course program that is tailored to the needs of the individual PhD student and project requirements.

4.1.3 Methodological expertise centers

Researchers in the institute can obtain support for a number of crucial steps in the research process of which we highlight four elements here; clinimetrics, epidemiology, statistical analysis and health technology assessment.

Knowledge center on Measurement Instruments

The mission of the *knowledge center on Measurement Instruments* is to optimize the quality of measurement in health science and medical research by consultations, education, and research. For this purpose, the center gives advice and cooperates with researchers from different fields of health science and medical research in searching for available measurement instruments, examining the quality of the available measurement instruments, choosing the most appropriate measurement instrument for a certain purpose, and designing and performing studies on measurement properties of measurement instruments. Important international research projects are: (1) the COSMIN initiative (www.cosmin.nl) which aims to improve the selection of health measurement instruments (2) the Dutch-Flemish PROMIS group (www.dutchflemishpromis.nl), which aims to translate, validate, and implement high quality IRT-based PROMIS instruments and Computer Adaptive Tests in the Netherlands and Flanders, and (3) our work in the field of Core Outcome Set development, i.e. agreed sets of outcomes that should be measures in reported in all clinical trials in a specific condition.

EpidM

APH research institute has a long standing expertise in epidemiology, of which the EpidM master program, accredited by the Accreditation Organization of the Netherlands and Flanders (NVAO), is a prime example (www.epidm.nl). Apart from the standard arsenal of epidemiological techniques, APH researchers are well versed in multilevel analysis, meta-analysis, genetic association analysis and mixed methods techniques. The latter are needed when addressing research questions that require a mix of quantitative and qualitative methods. For instance, quantitative methods can give insight in the frequency of a phenomenon, while qualitative methods can shed light on the way this phenomenon is experienced and impacts the life of people who encounter this phenomenon. Especially within the research program Methodology there is extensive experience with mixed methods of research, and this expertise is broadly shared with fellow APH researchers.

E&B Xpert

E&B Xpert is part of the VUmc department of Epidemiology and Biostatistics. It supports researchers at the beginning of their research in choosing appropriate study outcomes and measurement instruments, sample size calculations, and in preparing a plan for the statistical analysis of their data. E&B Xpert also assists researchers in analyzing data resulting from their

studies, in presenting the results in reports and papers and in answering reviewers' questions on statistical issues. E&B Xpert supports ranges from short consultations via e-mail, telephone or in person to long-term participation in medical and biomedical research projects. Statisticians, research methodologists, and health economists provide the expertise and support.

Health Technology Assessment

Health Technology Assessment (HTA) is a multi-disciplinary field of policy-analysis that examines the medical, economic, social and ethical implications of the incremental value, diffusion and use of a medical technology in health care (www.inahta.org). Economic aspects have become more and more important when evaluating the value of new interventions in health care. Thus, most HTA studies evaluate economic aspects associated with the use of existing and implementation of new interventions in health care. The main reason for this increased focus on economic aspects is that health care costs continue to rise in the Netherlands and in other developed countries, while the resources available for health care are scarce. Therefore, policy-makers need relevant information to be able to allocate such scarce resources as efficiently as possible. This type of information is typically provided by economic evaluations in which the costs and effects of an intervention are compared with usual care (i.e., cost-effectiveness). Accordingly, information on the cost-effectiveness of interventions is increasingly requested by governments, and funding organizations such as ZonMw and NWO also increasingly demand researchers to show the cost-effectiveness of their proposed intervention in comparison with usual care. Within APH research institute many trials are conducted that also include an economic evaluation. The design, conduct, analysis and interpretation of these economic evaluations are supervised by a group of experienced researchers embedded in the Department of Health Sciences of the VU University Amsterdam.

5. Scientific output

Publications or other forms of scientific output are considered APH output if, and only if, the institute has been mentioned in the affiliations of one (or more) of the co-authors, and the co-author was an APH researcher in the year of publication. Table 6 lists the number of APH-VU/VUmc/AMC refereed papers that was published in 2018, as well as other scientific output. Although the bulk of the output is in the form of papers in scientific journals, APH researchers also produce many book chapters and professional publications in clinical practice oriented journals, thus contributing to the necessary knowledge transfer to professionals in several health care settings. Appendix 3 provides a full list of the 2018 APH-VU/VUmc/AMC publications, ordered per program and by the main categories used in table 6 (i.e., refereed, non-refereed, book chapters, professional, general public).

Table 6 (SEP D3b) - APH-VU/VUmc/AMC scientific output in 2018 for the institute and per program

APH	APH	HBCD	MH	SPH	GH	ALL	QoC	PM	Meth
Refereed articles	2178	219	666	74	319	407	560	353	441
Non-refereed articles	130	21	21	20	12	20	36	17	24
Books and book chapters *	29	4	11	5	2	5	8	4	4
PhD-theses	138	21	40	8	28	24	56	19	17
Professional publications	166	15	43	35	12	31	82	45	10
Publications aimed at the general public	5	0	3	0	0	1	1	0	1
Other research output **	60	22	18	11	5	19	24	3	17
Total publications ***	2706	302	802	153	378	507	767	441	514

** In 2018, Books and book chapters consist only of academic books and book chapters. The books and book chapters aimed at the professional audience are listed by Professional publications.*
*** Other research output is defined as: abstracts, meeting abstracts, letter to the editor and editorials.*
**** The sum of the research output of the APH programs is more than the total APH research output. A scientific articles can be affiliated by more than one APH program.*

Table 6 also lists the number of PhD theses completed in 2018. A total of 138 PhD theses were produced in 2018, the titles of which give a very good overview of the APH-VU/VUmc/AMC research output (see appendix 4).

5.1 International benchmarking

A major aim of the institute is to generate scientific innovation and impact, for which quality is often more important than quantity. To measure impact, the Center for Science and Technology Studies (CWTS; www.cwts.nl) of the University of Leiden performed a bibliometric analysis, based on the citations of all APH VUmc publications over the past few years. According to the most recent CWTS bibliometric analysis APH researchers of VUmc co-authored 8182 scientific publications in Thomson Reuters Web of Science core collection between 1997 and 2015. For comparisons between faculties and between institutes CWTS calculates a so-called Mean Normalized Citation Score (MNCS) in which 1 represents world average.

To allow a more field-specific comparison of APH researchers to the world average, figure 2

presents the total number of publications (p) between 1997 and 2015, and MNCS (based on the number of citations between 2009 and 2016), for the subject categories in which we publish at least 100 papers. The categories 'Medicine, general and internal' and 'Multidisciplinary Sciences' contain a number of very generic, high impact journals such as Science, Nature and the New England Journal of Medicine, giving this categories a very high MNCS. The weighted citation score of APH researchers is above the world average across the board, and more than 50% is higher than the world average for 16 out of the 24 categories listed.

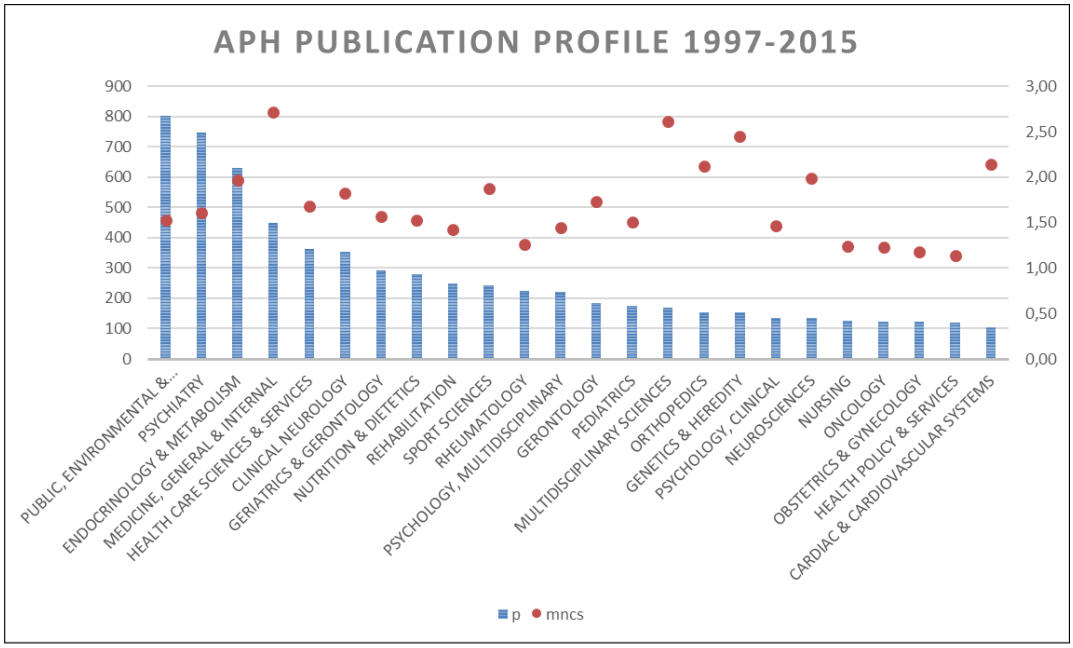


Figure 2 - CWTS analysis of the APH research institute's publication profile 1997-2015

6. Earning capacity

As shown in table 7, the APH institute has acquired €50 million in research funding. This earning capacity is satisfying in the face of continued reduction in core research funding and in the budgets of competitive national grant agencies (NWO/ZonMW), and an increase in the volume of the competition in the European arena, leading to low to very low *a priori* hit rates for collaborative grants. It attests to the high societal appreciation for our research and the grant writing craftsmanship of our researchers.

The bulk of our research remains externally funded, with public organizations as the main source (i.e. '2e en 3e geldstroom') and ZonMw (~12 million)/NWO (~€4 million) and the European Union (€15,5 million) still as the main contributors. Appendix 5 lists all grants and funding acquired by APH researchers in 2018.

Because our research is focused on societally relevant questions we are confident that sufficient funding opportunities for APH researchers will keep presenting themselves nationally and internationally.

Such encouraging developments should not, however, detract us from the harsh fact that the Dutch economic tide has not fully turned yet. Thus, we actively support our researchers in focusing on the grand challenges of the Horizon 2020 agenda of the European Union and in reaching out for public private partnerships. The merger of the AMC and VUmc provides unique opportunities to do so, by uniting an even larger number of Public Health researchers in a joint research institute.

Table 7 - Past and current acquisition of research funds for the institute (2018 APH total, 2013-2017 VU/VUmc part of APH only)

APH	2013	2013%	2014	2014%	2015	2015%	2016	2016%	2017	2017%	2018	2018%
RG	€ 10.572.350	39%	€ 6.307.295	29%	€ 11.878.842	47%	€ 16.646.394	56%	€ 14.074.150	41%	€ 31.411.640	63%
CR	€ 15.483.945	57%	€ 12.713.226	59%	€ 11.569.503	46%	€ 8.664.956	29%	€ 17.409.564	50%	€ 15.166.090	30%
OF	€ 930.535	3%	€ 2.389.170	11%	€ 1.708.450	7%	€ 4.431.616	15%	€ 3.168.412	9%	€ 3.200.126	6%
Total	€ 26.986.830	100%	€ 21.409.691	100%	€ 25.156.795	100%	€ 29.742.966	100%	€ 34.652.126	100%	€ 49.777.856	100%
of which EU	€ 7.672.424	28%	€ 3.342.014	16%	€ 5.595.581	22%	€ 4.465.594	15%	€ 9.006.873	26%	€ 15.427.358	31%

Abbreviations: RG = research grants, CR = contract research, OF = other funding

Table 8 - Overview of acquisition of research funds in 2018 for the institute and per program

Type	HBCD	MH	SPH	GH	ALL	QOC	PM	Meth	APH
RG	€ 3.558.752,88	€ 5.141.966,35	€ 2.601.445,00	€ 2.990.956,75	€ 1.453.936,00	€ 6.826.007,94	€ 7.653.065,28	€ 1.185.510,00	€ 31.411.640
CR	€ 263.005,00	€ 6.244.671,50	€ 752.566,00	€ 562.077,35	€ 1.211.149,31	€ 4.819.645,78	€ 683.244,00	€ 629.731,00	€ 15.166.090
OF	€ 182.405,03	€ 20.576,08	€ -	€ 59.700,00		€ 2.251.916,39	€ 654.084,00	€ 31.444,00	€ 3.200.126
Total	€ 4.004.162,91	€ 11.407.213,93	€ 3.354.011,00	€ 3.612.734,10	€ 2.665.085,31	€ 13.897.570,11	€ 8.990.393,28	€ 1.846.685,00	€ 49.777.856

Abbreviations: RG = research grants, CR = contract research, OF = other funding

7. Academic reputation

The excellent reputation of APH researchers is further illustrated by the many invited lectures given at scientific meetings, the awards and honors they obtained in 2018 as well as their prominence in the organization of conferences and congresses and their gate keeping positions as grant reviewers, (associate) editors of international journals or executive board/committee members of academic societies. Examples of this can be found in appendix 7.

Over the past few years four researchers in our APH community have been awarded with the prestigious membership of the Royal Netherlands Academy of Arts and Sciences. Also one of our researchers has been honorably recognized and encouraged with the highest award in Dutch Science, the NWO Spinoza Prize. Furthermore the National Organization for Scientific Research has awarded three APH researchers with a VICI Award, which is targeted at outstanding senior researchers who have successfully demonstrated the ability to develop their own innovative lines of research, and to act as coaches for young researchers.

Researchers in the APH research institute coordinate and maintain a number of renowned cohorts and biobanks, including (ongoing) large scale cohort studies such as the Netherlands Twin Register (NTR), Netherlands Study of Depression and Anxiety (NESDA), Netherlands Study of Depression in Older Persons (NESDO), Netherlands OCD Association (NOCDA), Netherlands Longitudinal Study on Hearing (NL-SH), GENERATION2, Hoorn and West-Friesland Diabetes studies, The Amsterdam Growth and Health Longitudinal study (AGHLS), and the Longitudinal Aging Study Amsterdam (LASA). They also maintain (inter)national databases including the RAI and the LTCF Ysis database. To support cross-cohort standardization, the APH research institute initiated and funded the EMGO Cohort Booster Project in 2015 to enrich these large-scale and on-going longitudinal studies within the APH research institute with a variety of existing geo-data. This initiative was still on-going in 2018.

8. Societal relevance

APH aims to produce excellent scientific research, but this research only fulfills its potential when it benefits society at large. Although analyses based on journal impact factors and the CWTS bibliometric approach may show that the scientific impact that APH research generates is high compared to the world average, we must acknowledge the limitations of these analyses. We specifically note that for the major aim of the institute, i.e. to generate scientific innovation that has a measurable societal and clinical impact, the analysis of journal or author impact factors is at best an incomplete instrument. Striving for societal impact not only justifies our use of public funds, but also provides focus for our research projects and direction for the institute's policy. We use the indicators proposed by the Dutch Health Council to evaluate and monitor the societal impact of our research.

In 2018 APH researchers contributed to several clinical guidelines and health policy reports on various topics, reflected in the shape of co-authorships. These guidelines and policy reports contribute to evidence-based practice and thus represent an important aspect of the societal impact of our research. Specific examples of these APH contributions to a directive, protocol or policy note can be found in appendix 8. In addition to the clinical guidelines and health policy reports, there are articles in national professional journals, articles written for the general public and (chapters in) handbooks that we consider contributing to the societal impact of our research. These products are included in appendix 3, in particular under the headings *professional* and *popular* publications. Appendix 8 also lists the APH memberships of civil society advisory bodies in the public or commercial field through which we can translate our scientific insights directly into policy, medical practice and medical products.

The results of APH research projects attract substantial attention from the media (see some examples highlighted in appendix 8). Our researchers were interviewed on television multiple times, and some interviews on national public radio were broadcasted. Interviews and articles about research projects and their results were published locally or nationally in newspapers (online and print) and magazine articles (online and print) and in different other online sources (e.g., weblogs, newsfeeds and online newsletters).

The internet is arguably the most important source of health information. Therefore, websites can be highly relevant for measuring the societal impact of APH's research. The APH research institute maintains a number of own websites, in part conveying general information, in part explaining the rationale and/or the results of our ongoing research and research collaborations.

A further indicator of societal impact is the many invitations APH researchers receive to deliver lectures to health care professionals, policy makers and non-professionals. Topics covered in these presentations can be gleaned from appendix 8, which examples of the 2018 lectures for various non-scientific audiences.

VUmc and VU researchers of APH are frequently involved in teaching programs based on the results of APH research projects. We have a major contribution to the regular curriculum of the bachelor and master programs of medicine (VUmc), psychology & educational science (VU FGB) and health sciences (VU FALW), as well as to the Master of Epidemiology. We also provide a substantial contribution to the 'lifelong learning' of healthcare professionals.

In order to have a true impact on the daily practice of extramural and transmural health care APH has established over the years a number of Research & Expertise Centers and the so-called Academic Collaborative Centers ('Academische Werkplaatsen'). The Research & Expertise Centers active in 2018 are listed in appendix 9. These centers cover specific topics of applied research and develop and provide expertise relevant to health care practice. The Academic Collaborative Centers are formal collaborations between APH and practice settings to conduct practice-based research of strong methodological rigor. Table 8 lists the APH Academic Collaborative Centers active in 2018. In these collaborative networks, practice, research, education and policy are brought together by direct collaboration between clinicians, teachers, researchers and managers.

Table 9 - APH Academic Collaborative Centers

Academic Collaborative Center	Aim	Partner(s)
Child and Youth Health Care	Improve knowledge transfer between health policy, research and education in child and youth health care. Providing scientific evidence for child health care practice and innovation.	Municipal Health Services of Amsterdam, Hollands-Noorden, Zaanstreek-Waterland, Gooi & Vechtstreek and the Child Health Care organization Kennemerland.
Healthcare Inspection (AWP Toezicht)	Build a scientific evidence-base for health care inspection activities and to provide insight in the process and effects of inspection activities on health care.	Healthcare Inspection (IGZ), iBMG, NIVEL, IQ Healthcare
Knowledge Center for Insurance Medicine (www.kcvg.nl)	Improve the quality of work disability assessments and developing and evaluating new return-to-work strategies and tools.	National Institute for Employee Benefits (UWV), AMC, UMCG
Occupational and Environmental Health Service • VU-AMD • Tata Steel • ArboUnie • ArboNed • KLM	Prevention of work-related complaints and disease, and effective return-to work intervention for those off work because of sickness. Improving work conditions, lifestyle and workers health.	VU University/VU University Medical Center, department for Occupational Health and Safety (AMD), Tata Steel, ArboUnie, ArboNed, KLM.
Network of Academic General Practices	Integrate scientific research, medical education, vocational training and innovation in general-practice care.	1. General Practice collaboration (Huisartsencoöperatie) Groot Zuid, Amsterdam. 2. Amsterdam Health Centers (Stichting Amsterdamse Gezondheidscentra, SAG). 3. HOED Leonard Springer, Haarlem.

University Network of Organizations for Elderly care (UNO)	Build a bridge between research and practice in long-term elderly care, especially in nursing homes.	Amaris Zorggroep, Amstelring, Argos Zorggroep, Beweging 3.0, Careyn, Cordaan, Evean, Hilverzorg, Quarijn, Sint Jacob, Viva Zorggroep, Vivium, Warande, Zonnehuisgroep Amstelveen, Zorgbalans, Zorggroep Noorderbreedte, Zorggroep Solis, Zorggroep IJssel-Vecht, Zorggroep Apeldoorn, Zorgspectrum
Anxiety Disorders Depression Bipolar disorders Old Age Psychiatry Soma & Psyche	Establish the biological basis of anxiety and compulsion disorders, unipolar and bipolar depression, and their comorbidity with somatic disorders to develop innovative interventions for patients treated for these disorders.	Psychiatry VUmc, Policlinic Anxiety and Compulsive disorders (poli Angst- en dwangstoornissen), Policlinic Bipolar Disorders (Poli bipolaire stoornissen Altrecht, Dimence), GGZ in Geest, Policlinic Soma & Psyche (poli onverklaarbare klachten)
Care for the Intellectually Disabled	Develop academic research on developmental pathways, personalized treatment and quality of care for people with intellectual disabilities in the Institution.	's Heerenloo Institute
Psychological Complaints	Provide evidence-based advice and support in case of sadness, anxiety, stress and other psychological symptoms.	GGZ in Geest-Prezens
Work, Participation & Income	Increase participation of people with occupational disabilities. Municipal professionals and researchers collaborate intensively in the development and implementation of cost-effective interventions with great relevance to the municipal practice.	Municipal Government of Amsterdam
Sarphati Amsterdam	Develop effective and sustainable prevention of welfare diseases, such as diabetes, obesity and cardiovascular disease. Promote a healthy lifestyle and optimal living conditions to prevent (serious) obesity among the Amsterdam youth.	The municipality of Amsterdam, Public Health Service of Amsterdam (GGD), UvA, Amsterdam UMC, VU and HvA.

Urban Vitality	Gezondheidsbevordering van Amsterdammers. Stadsbewoners helpen vitaal en gezond te worden of te blijven in de wijken, op scholen en bij sportverenigingen.	Amsterdam UMC, TNO, zorgcentra, sportinstellingen, migranten vertegenwoordigers, patiënten- en beroepsverenigingen
Amsterdam Institute for Global Health and Development (AIGHD)	The Amsterdam Institute for Global Health and Development (AIGHD) is an international research and education institute that works to develop sustainable solutions to major health problems.	Amsterdam UMC, Vu, UvA
Amsterdam Health & Technology Institute (AHTI)	De missie van AHTI is om gezondheid en de gezondheidszorg in steden te bevorderen door mensen, technologie en medische kennis met elkaar te verbinden op het gebied van innovatie & ondernemerschap.	Municipal Government of Amsterdam and several other partners
Amsterdam Rheumatology & Immunology Center (ARC)	Het ARC is een samenwerking tussen AMC, Reade en VUMC waardoor het reumatologisch onderzoek en onderwijs bij deze drie organisaties onder één noemer wordt gebracht.	Amsterdam UMC, READE
Ben Sajetcentrum	Het doel van het Ben Sajet Centrum is om nieuwe zorgpraktijk te ontwikkelen, waardoor de kwaliteit van leven van mensen – die op een vorm van langdurige zorg zijn aangewezen – structureel verbetert.	Amsterdam UMC, locatie AMC, Amsterdam UMC, locatie VUMC, UvA, HvA, VU, InHolland, ROC van Amsterdam, Cordaan, Ons Tweede Thuis, Amsta, Stichting Actief Burgerschap, Amsterdam Health and Technology Institute, Gemeente Amsterdam
Amsterdam Health Education And Discovery (AHEAD)	AHEAD richt zich op vernieuwing van toekomstbestendig gezondheidsonderwijs. Behalve inzet van kennis en ervaring, zijn ook proeftuinen nodig om experimenten in het gezondheidsonderwijs te initiëren en uit te voeren.	Amsterdam UMC, SIGRA, HvA

For a large part, funding for the research done within the academic collaborative centers comes from the societal stakeholders (e.g., companies, services, institutions), so these activities directly qualify as valorization. Economic product-based valorization of research, for instance in public-private partnerships, has not yet been strongly developed in the

APH research institute (appendix 10), although the embedded PhD program that started in 2013 is beginning to provide good bridgeheads into industry (see appendix 6).

Summary and explanation of the chosen output indicators

The Association of Universities in the Netherlands (VSNU), the Netherlands Organisation for Scientific Research (NWO), and the Royal Netherlands Academy of Arts and Sciences (KNAW) have jointly developed a new Standard Evaluation Protocol (SEP) for the period 2015-2021. The VUmc Research Institutes use this protocol as their main guideline in their annual reports and external visitations.

The new protocol allows a certain amount of freedom in choosing research output indicators to use in the reports. VUmc has chosen a number of indicators, approved by the VUmc Research Council ('VUmc Onderzoeksraad'), that we believe will demonstrate the excellent and translational character of our research in the best way.

The chosen indicators can be found in table 10.

Table 10 - Table with output indicators (SEP D1)

		QUALITY DOMAINS	
		Research quality	**Relevance to society**
ASSESSMENT DIMENSIONS	Demonstrable products	**1. Research products for peers** Indicators: • Research articles (refereed vs. non-refereed) • Scientific books and book chapters • Other research outputs (instruments, infrastructure, datasets, software tools or designs that the unit has developed) • Dissertations	**4. Research products for societal target groups** Indicators: • Reports (for example for policymaking) • Articles in professional journals and books/book chapters for a professional audience • Other outputs (instruments, infrastructure, datasets, software tools or designs that the unit has developed for societal target groups) • Outreach activities, for example lectures for general audiences, contributions to post initial education, and organizational activities
	Demonstrable use of products	**2. Use of research products by peers** Indicators: • Citations (see chapter 5) • Use of datasets, software tools, etc. by peers • Use of research facilities by peers	**5. Use of research products by societal groups** Indicators: • Use of research facilities by societal groups • Contract research
	Demonstrable marks of recognition	**3. Marks of recognition from peers** Indicators • Science awards/scholarly prizes • Research grants awarded to individuals • Invited lectures • Membership of scientific committees, editorial boards, etc.	**6. Marks of recognition by societal groups** Indicators • Public prizes • Valorization funding • Media attention • Number of professor positions paid for by societal groups • Membership of civil society advisory bodies