The Research Council of Norway

GLOBVAC 2 – the second Programme for Research for Global Health and Vaccination

Midterm External Evaluation

Programme
Global Health and Vaccination Research – GLOBVAC 2

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Final report 19 February 2016

Mid-term evaluation of the second Programme for Global Health and Vaccination Research (GLOBVAC2)

Report to the Research Council of Norway

By Dr. Thyra de Jongh, Dr. Peter Varnai, Dr. Göran Melin (project leader), Marina Svetachova, Maria Grudin, Joost van Barneveld

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Dr. Thyra de Jongh

Dr. Peter Varnai

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Marina Svetachova

Maria Grudin

Joost van Barneveld

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Abbreviations

Abbreviation	*Full*
CD	Communicable Disease
CICERO	Centre for International Climate and Environmental Research Oslo
CMI	Chr. Michelsen Institute
EDCTP	European & Developing Countries Clinical Trials Partnership
FPRH	Family Planning and Reproductive Health
GH&VR	Global Health & Vaccination Research
GHR	Global Health Research
GLOBVAC	Programme for Global Health and Vaccination research
IP	Intellectual Property
LLMIC	Low- and lower-middle Income Country
MCNAH	Maternal, Child, Neonatal and Adolescent Health
MDG	Millennium Development Goal
MFA	Ministry of Foreign Affairs
NIBIO	Norwegian Institute of Bioeconomy Research
NIPH	Norwegian Institute of Public Health
NMBU	Norwegian University of Life Sciences
NOK	Norwegian Kroner
NOKC	Norwegian Knowledge Centre for the Health Services
Norad	Norwegian Agency for Development Cooperation
NTNU	Norwegian University of Science and Technology
OUS	Oslo University Hospital
RCN	Research Council of Norway
SDG	Sustainable Development Goal
UiB	University of Bergen
UiO	University of Oslo
UiT	University of Tromsø
UUS	Ullevål University Hospital
WHO	World Health Organisation
YSR/YRT	Young Scientist /Young Researcher Talent grant

Executive Summary

The Programme for Global Health and Vaccination Research (GLOBVAC) was established in 2006 by the Norwegian government and is administered by the Research Council of Norway. Under the first GLOBVAC programme (2006–2011), the Norwegian government disbursed close to NOK377m to 70 research projects. The funding for GLOBVAC has since been renewed to fund a second programme, which covers the period 2012–2020 (GLOBVAC2). GLOBVAC2's primary objective is to "support high-quality research with potential for high impact that can contribute to sustainable improvements in health and health equity for poor people in low- and lower-middle income countries". It aims to do so by sustainably strengthening the capacity to conduct global health and vaccination research, both within Norway and abroad.

This report presents the findings of the mid-term evaluation of GLOBVAC2 (2012–2015), as well as a brief summative impact evaluation of GLOBVAC1. The findings are based on input from project leaders, members of the GLOBVAC Secretariat and Programme Board, external stakeholders, and an international panel of independent experts. The evaluation was carried out by Technopolis Group between September 2015 and February 2016.

The evaluation team finds that the GLOBVAC programme has made significant achievements in a number of areas and fills an important gap in the Norwegian funding landscape. It has been particularly successful in boosting the national capacity for global health and vaccination research. The number of research groups and institutions that are involved in the field has markedly increased. There is a much greater degree of collaboration, both nationally and internationally, with a clear emphasis on North-South cooperation. The latter has contributed to essential capacity development in the South. The programme has already achieved some remarkable scientific successes that will have important impact on the health of target populations. The scientific quality and relevance of the project portfolio are found to be overall good, with numerous projects even achieving recognition at an international level. Nonetheless, there is scope for improvement and in going forward several issues will need to be considered.

The thematic priority areas concerning health systems & policy research, implementation and innovation research are, at present, underrepresented in the portfolio. If considered a continued priority, RCN should aim to strengthen these, for instance through training of junior researchers and international collaboration with institutions with a proven track record. An ongoing challenge is retaining the appropriate balance between focus and flexibility. To safeguard and build upon the impact made to date, we recommend that the GLOBVAC programme maintain a clear focus on a limited number of priority areas, but allow for flexible interpretation of these. Similarly, although much of the attention has focused on projects at the far end of the R&D value chain –where there is the most immediate, visible impact–, GLOBVAC is also a highly essential funder of basic research. The programme should therefore preserve this important balance in the portfolio, whilst providing researchers the opportunity to move their projects forward along the value chain.

Despite GLOBVAC's commendable efforts in research capacity development in the South, this objective is potentially overambitious within the current form of the programme, and may require a rethink into new approaches. These could include allowing South-based institutions to take project ownership, concentration of resources, and collaboration with other capacity development initiatives.

Current constraints on the development aid budget have led to uncertainties about funding for the remainder of the programme period. Reductions to the budget likely would jeopardise the programme's ability to fully achieve its stated aims and objectives. Whilst much progress has been made, there is a wide consensus that the investments made to date are just beginning to show their impact and that the national capacity that has been built is not yet self-sustainable. Erosion of the funding base for GLOBVAC2 is therefore strongly discouraged.

1 Introduction

This is the final report of an independent evaluation of two programmes called GLOBVAC1 and GLOBVAC2, conducted by Technopolis Group at the request of the Research Council of Norway (RCN) between September 2015 and February 2016. Following this introductory chapter, Chapter 2 presents a concise summative assessment of the GLOBVAC1 programme, based on a financial analysis and an assessment of outputs produced by the programme, illustrated by impact case studies. Chapter 3 provides a more comprehensive formative assessment of the first half of GLOBVAC2, for the period between 2012 to 2015. It uses data obtained from desk research (including financial data), as well as survey findings and qualitative information from stakeholder interviews. The concluding Chapter 0 discusses the findings in their context and provides the conclusions and recommendations by the evaluation team.

1.1 Background to the programme

Global health research (GHR) encompasses the study of determinants of health, of the role of health systems and policies, and of disease causes and their epidemiology. Furthermore, it includes the development of novel vaccines, medicines, and health technologies for the prevention, detection, care and treatment of diseases. Whilst GHR concerns all countries and all health conditions, in practice it is most frequently associated with diseases that disproportionally affect those in the developing world. Because of the lack of clear profit potential, much of the research in this field has been concentrated in publicly funded institutions, including universities and research institutes and, more recently, in public-private partnerships. Governmental and non-governmental funders are playing a pivotal role in financing this type of research. The Norwegian government supports GHR in various ways. For instance, over the years it has provided substantial funding to product development partnerships (PDP) and WHO programmes, and is a contributor to the European & Developing Countries Clinical Trials Partnership (EDCTP). In recent years, it has also provided support to Norwegian-based institutions for GHR through the Global Health and Vaccination (GLOBVAC) research programmes.

The first programme for Global Health and Vaccination Research (GLOBVAC1) was created in 2006 by RCN and fell under the responsibility of the Department for Global Issues. It was composed of two separate, though clearly linked, sub-programmes. The first sub-programme was a continuation and scaling-up of the Global Health Research (GLOBHELS) programme established in 2003. The second, the sub-programme for vaccination research, was added in 2006 as part of Norway's commitment to the fourth Millennium Development Goal (MDG) of reducing child mortality by promoting research for vaccine-preventable diseases. The GLOBVAC1 programme prioritised research on poverty-related diseases and health problems that affect marginalised populations, especially children, in low- and middle-income countries. GLOBVAC1 was finalised at the end of 2011.

Under the first GLOBVAC programme (2006–2011), the Norwegian government disbursed close to NOK377m to 70 projects, including a reallocation of NOK50m originally intended for The Vaccine Alliance (GAVI).[1] The funding for GLOBVAC has since been renewed to fund a second programme, which covers the period 2012–2020.

Whilst GLOBVAC2 is a continuation and expansion of the first programme, it has somewhat different thematic priorities. Its primary objective is to "support high-quality research with potential for high impact that can contribute to sustainable improvements in health and health equity for poor people in low- and lower-middle income countries (LLMIC)". Its secondary objectives are to:

- Develop and support internationally competitive and sustainable public and private research groups and institutions in Norway
- Develop and support national and international research collaboration and partnerships

[1] Based on data provided by RCN

- Secure capacity building through developing and supporting partnerships with research groups and institutions in LLMIC
- Inform and increase awareness among policymakers, researchers and the public about needs for and results from global health research

To achieve the above, and align with international needs and priorities, GLOBVAC2 prioritises projects in the following five thematic areas:

1. Prevention and treatment of, and diagnostics for, communicable diseases, particularly vaccines and vaccination research
2. Family planning and reproductive health (FPRH) & maternal, neonatal, child and adolescent health (MNCAH)
3. Health systems and health policy research
4. Implementation research
5. Innovation in technology and methods development for maternal and child health in settings where appropriate technologies are not available or non-existing

The Health Department at the division for Society and Health at RCN has been charged with the administration of the GLOBVAC2 programme. A Programme Board, nominated by RCN, is charged with ensuring that the programme meets its designated objectives and is implemented as well as possible, in accordance with the stipulated plans.[2] The Programme Board is also responsible for financial decisions regarding allocation of funding to the different research projects within the programme. The programme has had an annual income of NOK 121.8 million from 2013, with the majority of funds originating from Norad. Funding for the period 2016–2020 is contingent upon the outcomes of the present evaluation.

1.2 Aim and scope of the evaluation

This evaluation consists of two complementary parts. The first part is a summative evaluation of GLOBVAC1 (2006–2011), providing cumulative data from implemented projects, and a limited number of case studies to illustrate its impact. This summative evaluation supports the second part, a mid-term evaluation of GLOBVAC2 (2012–2015) for the purposes of identifying the programme's strengths and weaknesses to date, and subsequently formulating recommendations on how to maximise impact for the remainder of the programme (2016–2020). Within this formative part of the evaluation, a distinction can be made between an assessment of the implementation processes of the programme, and an assessment of the appropriateness, effectiveness and relevance of the current project portfolio. The latter was executed by an international Expert Panel that was appointed for the purposes of this review.

The formative evaluation provides insight into whether the GLOBVAC2 programme is on track to achieve its stated aims and objectives (Section 1.1). The evaluation covers all five of the thematic priorities of GLOBVAC2. Furthermore, the evaluation assesses whether the findings of the *2009 Midterm Review* of the programme period 2006–2011 (GLOBVAC1) were acted upon and considers whether the programme as a whole has contributed to increased gender balance of researchers in Norway and the focal countries.

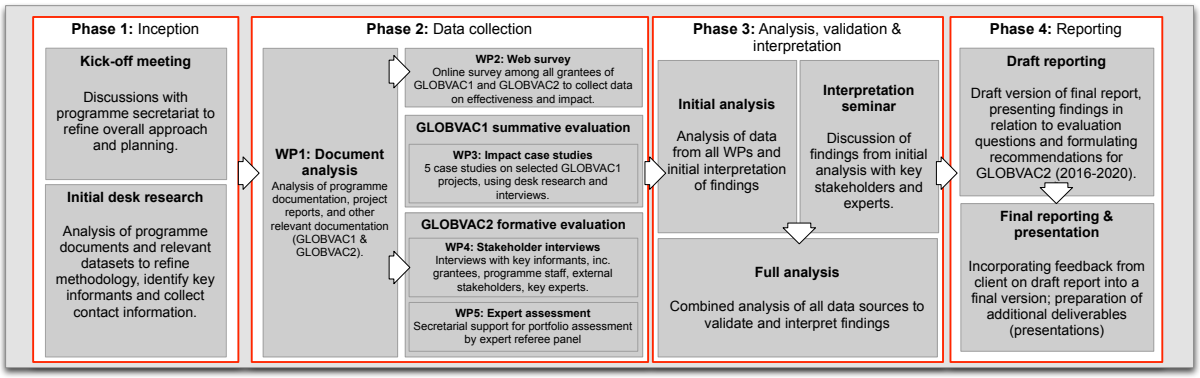
In accordance with the above, the scope of the evaluation has been limited to the projects and activities carried out under the GLOBVAC1 programme and those currently being implemented under GLOBVAC2. Furthermore, the formative component of the evaluation has focused on the project portfolio as *a whole* and was not an assessment of the results and sustainability of *individual* ongoing research projects.

[2] The current board serves for the period 2015-2017 http://www.forskningsradet.no/prognett-globvac/Programme_Board/1224697869244. (Accessed Jan 2016)

1.3 Methodology

In order to address the relevant evaluation dimensions, a work plan was designed comprising several individual, but interlinked work packages and activities (Figure 1).

Figure 1 Methodological approach and phases of the evaluation



Source: Technopolis Group (2015).

Table 1 presents the evaluation questions, a set of indicators, and the data sources and methods that we applied to answer the evaluation questions.

Table 1 Evaluation questions, indicators and data sources

Evaluation question	**Indicators**	**Data sources & methods**
To what extent…		
Relevance: *1)* Are the objectives of the programme aligned with the most pressing GHR needs and knowledge gaps? *2)* Are the objectives of the programme aligned with, or complementary to, GHR priorities of other national and international bodies (eg Norwegian Forum for Global Health, Norad/NORHED, World Health Organisation (WHO), EU, EDCTP, UN Sustainable Development Goals)?	*1)* Perception of relevance of thematic areas and portfolio composition *2)* Thematic alignment of research agendas	*All* • Desk research • Stakeholder interviews • Expert assessment
Effectiveness: *1)* Has the programme contributed to new GHR activities and scientific outputs in the thematic priority areas: • Prevention and treatment of, and diagnostics for, communicable diseases (including vaccines) • FPRH / MNCAH • Health systems and health policy research • Innovation in technology and methods development • Implementation research?	*1)* • Number of projects funded • Scientific output (journal articles, patents, conference presentations, abstracts and posters) • National and international conferences attended • New methods or prototypes developed (eg patents) All data will be analysed per thematic area	*1)* • Desk research (programme documents; project plans & reports) • Survey (quantitative data on outputs) Triangulation through stakeholder interviews

2) Has the programme contributed to the intended results of: • Development of a high-quality GHR infrastructure in Norway • Development and support of national and international GHR collaboration and partnerships • Capacity development for GHR in LLMIC • Increasing awareness about the needs for GHR?	*2)* • Number, type and affiliation of recipients of GLOBVAC funding, per year • Number of projects that have obtained co-funding or follow-on funding from other sources • Number of doctoral and post-doctoral fellowships • Number of students graduated • Number of partnerships (new and existing) between Norwegian GHR institutes and: – National institutions – Institutions abroad (non-LLMIC) – Institutions in LLMICs • Media publications (in print and online)	*2)* • Desk research (programme documents; project plans & reports) • Survey (quantitative data on outcomes) Triangulation through stakeholder interviews
Efficiency: Have the funding schemes and resources been utilised optimally to meet the overall aim and the thematic priorities of the programme?	• Success rate of projects funded • Project size / outputs • Perception of programme efficiency	• Desk research • Stakeholder interviews • Expert Panel
Utility / impact: Has the programme contributed to its primary objective of improvements in health and health equity for target populations?	• Estimates of areas and extent of health impact	• Desk research (project reports) • Stakeholder interviews • Expert Panel
Durability: Are the results and impact achieved by the programme sustainable for the long-term without further programme support?	• Estimates of future resource requirements (financial and other) • Perceptions of sustainability	• Stakeholder interviews • Survey • Expert Panel
Cross-cutting: Contributed to increased gender balance of project leaders and scholarship candidates in Norway and in LLMICs?	• % of female senior researchers involved in funded activities, per year	• Desk research • Survey

Specifically, the following tasks were conducted:

WP 1 Inception and desk review

The purpose of the inception phase was primarily to clarify mutual expectations about the evaluation between RCN and the evaluation team, and to share relevant documentation. A kick-off meeting took place in Oslo on 10 September 2015. During this meeting and in the ensuing inception phase agreements were made regarding the list of interviewees, the selection of impact case studies, and the assignment of experts to the external assessment panel.

RCN provided Technopolis with comprehensive documentation (Appendix A), relevant sections of which were reviewed to provide the evaluation team further understanding of the background and objectives of the programme, of the content of the funded projects, and of areas for attention as identified during previous evaluations and the self-assessment of the GLOBVAC Board. RCN also provided the evaluation team with a letter of invitation and contact details for survey respondents and interviewees.

Work package 2: Web survey of project leaders

The evaluation team prepared an online survey to collect data from project leaders on various evaluation dimensions (Appendix B). The survey was sent to all GLOBVAC grant recipients. The survey included a question to distinguish whether the respondent was a grant recipient of GLOBVAC1, GLOBVAC2, or of both programmes. The primary analysis presented in this report is based on aggregate data across all respondents, but additional sub-analyses were also conducted for hereto-relevant questions. The survey was distributed to a total of 90 principal investigators on 3 November 2015. Up to two reminders were sent. The survey was formally closed on 27 November 2015. Of the 90 principal investigators, 59 (65 percent) completed the survey in whole or in part. Of these, 13 (22

percent) had participated in GLOBVAC1 only, 27 (46 percent) in GLOBVAC2 only, and 19 (32 percent) in both.[3]

Work package 3: Impact case studies

A series of impact case studies has been performed to highlight some of the most important results achieved under the GLOBVAC programme to date. It was originally envisaged that these would be sampled from the project portfolio of GLOBVAC1 only. However, after consultation with RCN, it was decided to also include one project from the GLOBVAC2 portfolio that has already achieved significant results. The case studies are based on analysis of project documentation and, in some cases, on interviews with the principal investigators.

Work package 4: Stakeholder interviews

Stakeholder interviews formed an important part of the evaluation. The list of interviewees, including project leaders, members of the GLOBVAC Programme Board and Secretariat, and other key stakeholders, was drawn up in consultation with RCN and an Expert Panel.[4] Interviews were conducted either face-to-face or by telephone. The interviews were semi-structured, based on an interview guide (Appendix C) and lasted for up to 60 minutes. In total nine interviews with principal investigators and ten interviews with other stakeholders were conducted.

Work package 5: Secretary services to the Expert Panel

The objective of the Expert Panel was to assess the extent to which the current portfolio is relevant and effective to deliver the objectives of GLOBVAC2, based on a review of constituent projects (2012-2015). Their formative assessment has been used to provide a baseline for current research activities and to contribute to recommendations to maximise the impact of the GLOBVAC programme in the period 2016-2020. A summary report of the expert review of the GLOBVAC2 project portfolio is available in Appendix D.

The Expert Panel was appointed by RCN and was composed of five internationally recognised scientists with high-level expertise in the required thematic priority areas of the global health programme, both in the medical and social science disciplines. Each member signed a declaration that included a statement on impartiality and confidentiality. Panel members were provided relevant programme and project documentation. It should be emphasised that the purpose of the expert review was not a peer-review assessment of individual projects, but rather a way to obtain an evidence-based review of the thematic composition of the GLOBVAC2 programme portfolio.

Each project was allocated to at least two Panel members, based on their area of expertise. All project types were reviewed by the Panel, with the exception of event support projects, giving a total of 53 projects for the expert assessment. The assessments were recorded using a standardised assessment form. The experts allocated a numerical rating for each evaluation dimension and supplemented this with a short explanatory comment. The numerical scoring should be interpreted as follows:

Score	Description	Definition
5	Internationally excellent (very high)	The output of the programme is comparable with the best work internationally in the same area of research. The research possesses the requisite characteristics to meet the highest international standards. Work at this level should be a key international reference point in the respective area.
4	Internationally visible (high)	The output of the programme meets a high standard in terms of

[3] To protect the privacy of respondents, the full survey responses are not included in this report, but have been made available to the GLOBVAC Secretariat.

[4] It was agreed with RCN that the interviewees will remain anonymous. However, the full list of interviewees has been made available to the GLOBVAC Secretariat.

		originality and importance. Work at this level can arouse serious interest in the international academic community, and international publishers or journals with the most rigorous standards of publication (irrespective of the place or language of publication) could publish work of this level.
3	Nationally good (adequate)	The output of the programme is considered good at the national level. Nationally recognised publishers or journals are likely to publish work of this level. There is some potential for publication by international publishers or journals as well.
2	Nationally not good (low)	The output of the programme contains new scientific discoveries only sporadically and falls short of national standards. Researchers are not involved in international debates of the scientific community. Work of this level is unlikely to be published in recognised journals.
1	Very poor (very low)	The output of the programme is considered very poor by any scientific standards. Work of this level is unlikely to be published.

1.4 Study limitations

As with any study, a number of limitations should be taken into account in the interpretation of our findings. First, the opinions represented in this report from project leaders, programme managers and other stakeholders are those of a relatively small group of people, most of whom have vested interests in the programme. This is likely to introduce a degree of bias with a tendency to view the programme's achievements in an overly positive light. Where possible, we have sought to mitigate this risk by use of a panel of independent experts who have reviewed the scientific quality and relevance of the programme against international standards.

A survey was circulated amongst all project leaders to gather information about their perspectives on the programme. The overall response rate (65 percent) was reasonably good, matching with Technopolis' previous experiences in similar evaluations. Whilst we cannot exclude respondent bias, we have no indications that the respondents are not representative of the wider group of project leaders. Rather, in our experience many people who are invited to participate in a survey (particularly without clear incentives) are either unwilling or unable to do so within the given time period. It should also be taken into account that, for numerous investigators who were invited to participate, several years had already passed since their last interaction with the programme and others had received funding for only relatively minor activities.

Furthermore, much of the impact here reported is attributable to a comparatively small number of 'success stories' and were purposely selected. Although these are important measures of the success of the programme, and underscore the programme's potential for achieving impact, they are not necessarily representative of the programme as a whole.

Last, members of the Experts Panel indicated that the structure of the project proposals and annual progress reports, and the level of information available within these, made it difficult to scrutinise all required dimensions of the evaluation in detail. Research proposals and progress reports were considered short on detail, in particular on research methods and budget information, and, because projects within the portfolio were at different stages of implementation, direct comparison was often problematic. Also, experts were not always familiar with current costs of research in all countries relevant to the research projects.

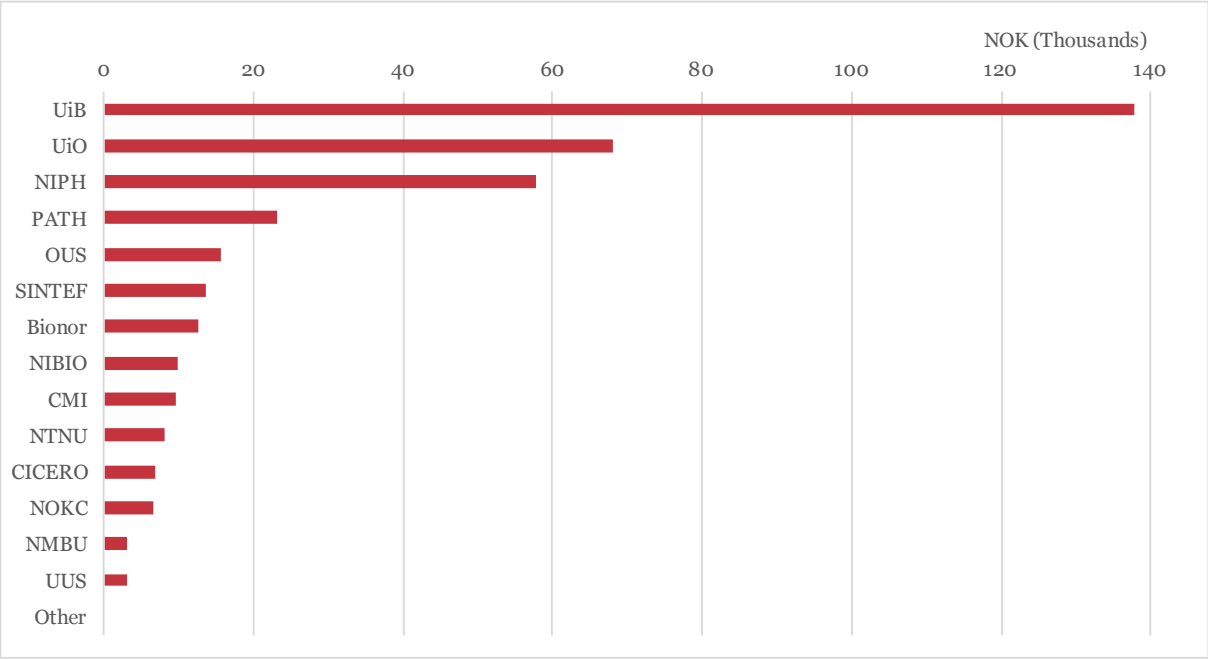
2 Summative evaluation of GLOBVAC1 (2006-2011)

In this chapter, we present a summative assessment of the GLOBVAC1 programme. Specifically, this chapter provides cumulative data on the input, outputs, outcomes and impact of the programme. It also includes a limited number of case studies to illustrate impact. Although one of the case studies (Case study 5) was in fact supported by the second programme, it has been included in this chapter for the sake of readability of the report.

2.1 Funding allocation

During the GLOBVAC1 programme period the Norwegian government, through RCN, disbursed close to NOK377m to the 70 projects and activities in the GLOBVAC1 portfolio.[5,6,7] The main recipients were the universities in Bergen (UiB: 23 grants, NOK138m) and Oslo (UiO: 16 grants, NOK68m), followed by the Norwegian Institute for Public Health (NIPH: 11 grants, NOK58m) (Figure 2). Together these three institutions received 70 percent of the total RCN funding.

Figure 2 Total RCN funding per institution



Source: Technopolis Group (2016), based on data provided by RCN.[8] 'Other' includes Inovio AS, the University of Tromsø and the Norwegian Biotechnology Advisory Board. These organisations each received minor grants for event and project establishment support.

Grants for research projects formed the lion's share of the portfolio, amounting to 94 percent of all funding allocated (Figure 3). The average size for research project grants was NOK6.5m, although

[5] Several are still ongoing

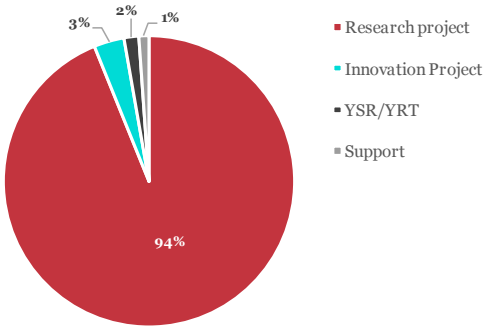
[6] Funding ministries: Ministry of Foreign affairs, Ministry of Health and Care Services, Ministry of Education and Research

[7] Types of activities under the GLOBVAC1 portfolio are: Event support, Innovation Project - Industrial Sector, Network support, Project establishment support, Research Project, Young Scientist / Young Researcher Talent.

[8] NIPH – Norwegian Institute of Public Health, OUS – Oslo University Hospital, NIBIO – Norwegian Institute of Bioeconomy Research, CMI – Chr. Michelsen Institute, NTNU – Norwegian University of Science and Technology, CICERO – Centre for International Climate and Environmental Research Oslo, NOKC – Norwegian Knowledge Centre for the Health Services, NMBU – Norwegian University of Life Sciences, UUS – Ullevål University Hospital, which was merged with the Oslo University Hospital in 2009.

there was significant variation within this category: the largest grant was NOK23m (awarded to PATH), the smallest grant NOK813k (awarded to NIPH).

Figure 3 GLOBVAC1 funding allocation by grant type



Source: Technopolis (2016), based on data provided by RCN. The category 'support' includes grants for network support, event support, and project establishment support. (YSR/YRT = young scientist /young researcher talent grant)

Universities and university hospitals were the main recipients of funding (63 percent). They were followed by independent and other public sector research institutes (jointly 28 percent). Private sector organisations received around 3 percent of all RCN funding. The remainder (6 percent) was allocated to PATH, a non-profit product development partnership based in the USA.

In GLOBVAC1 there were no prioritised thematic areas (in contrast with GLOBVAC2), but, the allocation of funding may be broken down into two categories, namely vaccination research and global health/other research. Of the total NOK377m, NOK275m (73 percent) was allocated to vaccination research and the remaining NOK102m (27 percent) to global health/other research.

2.2 Output analysis

As outlined in the description of the evaluation framework above, for the GLOBVAC programme to achieve its intended outcome and impact, it is essential that findings from research activities be disseminated so that they may be translated into relevant technologies and interventions. Organisations that received funding under GLOBVAC1 were required to provide RCN with regular overviews of the output they had generated. Table 2 summarises the key output data, drawn from the final project reports supplied by RCN, for all 70 projects in the GLOBVAC1 portfolio.

Table 2 Summary of outputs generated from GLOBVAC1 research projects

Category	Type of output	Number
Scientific / scholarly publications	Articles in scientific/scholarly journals or series	531
	Articles in anthologies	455
	Monographs	112
	Total	**1,098**
Dissemination for users & the general public	Reports, memoranda, presentations at meetings/conferences	462
	Popular science (eg articles/books for general audiences, exhibitions)	81
	General media (eg newspapers, radio, TV)	1,347
	Total	**1,890**
Value creation (Introduction of new/improved ...)	Work processes or business models by companies participating in the project	7
	Methods, models or technologies by companies participating in the project	53
	Methods, models or technologies by companies external to the project	12
	Total	**72**
Commercial results	Products	10

(Finalisation of new/improved …)	Processes	6
	Services	6
	Methods/models/prototypes	32
	Total	**54**
Industry oriented R&D results	Licensing agreements signed	0
	Patents registered	8
	Total	**8**
New business activity	New companies launched as a result of the project	0
	New businesses areas in existing companies as a result of the project	16
	Total	**16**

Source: Technopolis Group (2016), based on data provided by RCN.

The 58 projects with a clear research focus (ie 54 research projects, 2 innovation projects, and 2 young scientist/young researcher talent grants) jointly contributed to 531 articles in scientific journals, and a further 567 in anthologies and monographs. This amounts to an average scientific output of over 9 articles per project, which may be considered rather high given the fact that research projects often take time before they yield publishable results. It is therefore worth noting that this average 'productivity' is heavily skewed by a relatively small number of projects that account for a disproportionally large share of scientific articles. The top six most 'productive' research projects each yielded 25 articles or more, jointly accounting for nearly half of all such articles. Conversely, 31 research projects resulted in under five articles.

In terms of dissemination of findings through other means of communication, results from GLOBVAC1 projects were frequently presented at national and international conferences, as well as in general media. However, again it should be noted that the numbers presented in Table 2 are heavily skewed. Two projects in particular account for nearly all of the general media attention: the Vacc-4x trial (see Case study 2) and the Rotavac trial (see Case study 4) jointly make up over 90 percent of the 1,890 reported instances.

Valorisation of research findings in the form of introduction of new processes, methods or other commercially relevant outputs has taken place on a limited scale. Two projects at UiO that involved the use of integrated Health Information Systems to strengthen vaccination services reported having contributed to the introduction of new methods and technologies, in keeping with the direct objectives of these projects. However, nearly all other projects did not report any value-creating activities. Contributions to commercially relevant outputs were similarly limited to a small number of projects that directly focused on development of new, mainly electronic, innovations, and in a few cases on development of vaccines.

Generation and protection of intellectual property (IP) was not frequently reported for GLOBVAC1 funded projects. Nevertheless, four projects indicated that registration of new patents had occurred. These projects all involved development of vaccines or vaccine components for various infectious diseases (including diarrhoeal diseases, dengue fever, and tuberculosis).

Lastly, we observe a close correlation between the projects that reported commercial results and the generation of new business activities. All 16 instances of new business areas arising in existing companies emanate from five projects that also reported development of at least one new or improved product, process, service or method.

Overall, the GLOBVAC1 programme has generated a considerable output, mostly in terms of scientific contributions and to a more limited extent in terms of results that may ultimately lead to marketable products or services. This in turn raises hopes that the programme can indeed make a contribution to improved health outcomes and impact for target populations in the medium and longer term, though for most projects such outcomes are not yet within reach.

2.3 Impact case studies

Case study 1: Phase III double blind placebo-controlled trial of infant peri-exposure prophylaxis with 3TC to prevent HIV-1 transmission by breastfeeding (project 183600, GLOBVAC1)

Background

The project objective was to provide a new evidence-based drug regimen to support HIV-1-infected women not eligible for highly active antiretroviral therapy (HAART) to safely breastfeed their babies. Breastfeeding transmission accounts for a significant part of the new HIV-1 infections among babies. In 2011, around 330,000 children were newly infected through mother-to-child transmission (MTCT), an estimated one third of which are attributed to breastfeeding.

There are two main approaches to prevent vertical transmission of HIV-1; either by treating the infected individual with antiretroviral therapy (maternal ART) or by giving preventive treatment to the uninfected individual (pre-exposure prophylaxis, PreP). There are currently two PreP treatments available: nevirapine (NVP) and lamivudine (3TC). These two treatments have proved efficacious in clinical studies until 6 months after birth. However, despite the WHO recommended duration of breastfeeding of 12 months, no study has covered more than 6 months.

This project compared the efficacy and safety of two PreP drug regimens: Lopinavir/ritonavir (LPV/r) against lamivudine (3TC) during 50 weeks of breastfeeding. LPV/r, although not previously tested as PreP, has a good safety profile in young children and a high level of antiviral activity. In addition to comparing the efficacy and safety of these two drug regimens, the project aimed to build capacity at the four clinical trial study sites. Over 1,200 HIV-exposed infants in Burkina Faso, South Africa, Uganda, and Zambia randomly received one of the two drug regimens.

The project was led by a consortium with three European and four African partners. Total funding for the project amounted to NOK 89 million, of which 17 percent was provided by RCN. Additional funding was received from Agence National de Recherche sur le Sida (ANRS) in France, EDCTP and the Swedish development agency (Sida).

Outputs and outcomes

The two tested regimens proved similarly efficacious after 50 weeks. Infant ART prophylaxis was shown to substantially decrease the breastfeeding risk of transmitting HIV, to work at a scale greater than previously studied, and to be effective and safe. The study has resulted in over 14 scientific articles, including in the Lancet, and a number of reports and presentations.[9,10] It has also led to the creation of a biobank of blood and milk samples that are stored in France and Zambia. Capacity has been built, not just in Europe, but also at the involved research institutes and clinical trial sites in Africa. Moreover, a number of PhD candidates affiliated with African research institutes were involved in the trials. The project also stimulated representation of women in global health research, as three out of eight project leaders were women and most staff at the trial facilities were women.

Relevance and durability

The project objectives are clearly aligned with two of the Millennium Development Goals (ie MDG4 on reducing child mortality and MDG6 on combatting HIV). Results are relevant for updating of the WHO HIV guidelines. The current guidelines, proposing PreP as the only treatment option, were based on limited evidence available at the time. The WHO has already requested the data from the study to feed into the next update of the guidelines. There are plans to conduct follow-up studies of the trial in order to assess the long-term effects of the drug regimens. Moreover, the biobank of blood and milk samples will be used in a number of upcoming ancillary studies.

[9] Nagot, N., Kankasa, C., Tumwine, J. K., Meda, N., Hofmeyr, G. J., Vallo, R., ... & ANRS 12174 Trial Group. (2015). Extended pre-exposure prophylaxis with lopinavir–ritonavir versus lamivudine to prevent HIV-1 transmission through breastfeeding up to 50 weeks in infants in Africa (ANRS 12174): a randomised controlled trial. *The Lancet*.

[10] Coovadia, H., & Moodley, D. (2015). Improving HIV pre-exposure prophylaxis for infants. *The Lancet*.

Case study 2: Development of a peptide-based HIV-1 therapeutic vaccine candidate Vacc-4x. (2008 – 2011) (Projects 185783, and 192538, GLOBVAC1)

Background

The two projects jointly represent the first year and then completion of a large placebo-controlled Phase II clinical trial for a candidate therapeutic vaccine for HIV-1 infection: Vacc-4x. The purpose of Vacc-4x is to strengthen immune responses to the virus and thereby achieve improved control of the infection. The study sought to test whether immunisation with Vacc-4x could reduce levels of virus during a period free from conventional HIV medication, antiretroviral therapy (ART). The potential for achieving periods in which the infection is completely controlled, while free from ART, is now called 'functional cure' which could reduce pill burden, side effects, healthcare costs and the emergence of drug resistance. The aim of the study was initially to establish a pivotal trial to accelerate approval and registration. However, it proved unfeasible to enrol the required 345 patients within the given timeframe. The study was therefore transformed to an exploratory study, enrolling 135 patients. Despite this reduction, this still represents the largest therapeutic vaccine trial for HIV globally. The project is owned by Bionor Immuno AS, a wholly owned subsidiary of Bionor Pharma ASA, with University of Lausanne and the University of California as the main partners. RCN provided a fixed contribution worth 13 percent of the combined total project costs.

Outputs and outcomes

Study findings showed that Vacc-4x is safe, well tolerated and significantly reduced viral load compared to placebo. The trial has brought development of a therapeutic vaccine for HIV a step closer and its results will be of interest to future licensing partners and collaborators. Although the study was carried out in the US and Europe, the results are potentially also of great relevance to LLMICs. The study forms a benchmark in the field for other therapeutic vaccine candidates in development.

The results of this project have contributed to the development of a research collaboration with a large pharmaceutical company, Celgene, that produces Revlimid, a cancer treatment. This collaboration has assessed the potential for Revlimid to function as an immune modulator in combination with Vacc-4x in HIV-infected individuals with low immune competence. In a separate project with Celgene, Vacc-4x is being tested in combination with romidepsin, a different cancer treatment, to see how this combination may contribute to a functional cure by reducing the level of viral reservoirs hidden in the body.

The projects have contributed to capacity building in Norway. Although the project did not result in additional post-docs and doctoral candidates, Bionor did recruit more personnel. In addition, the project contributed to competence building within Bionor for conducting clinical trials and has resulted in new partnerships with hospitals and Universities in Europe and the US as well as contact with key opinion leaders in the field, a number of which have joined Bionor's clinical advisory board. The research has resulted in a large number of publications in both the scientific and popular media, both nationally and internationally.

Relevance and durability

The International AIDS Vaccine Initiative (IAVI), the Bill and Melinda Gates Foundation, and the Global Fund focus purely on preventative vaccines and consider therapeutic vaccines beyond their scope of interest. Therefore, the support of GLOBVAC has filled an important funding gap, as other grant funding for therapeutic HIV vaccines is scarce. According to the project leader, since funding from RCN is peer reviewed this defines the quality of the research, which is important when developing new projects and collaborations with external partners. The encouraging results of these studies have led to further projects and continued support of RCN through GLOBVAC2 where Bionor has received funding for three more projects.

Case study 3: Biomarkers of mycobacterial infection and disease, and molecular characterization of mycobacteria from high TB-burden countries (Project 196362, GLOBVAC1)

Background

Purpose of this Young Researcher Talent Grant was to enhance the scientific expertise of a post-doctoral scientist for conducting research on tuberculosis (TB). The grant was fully funded by RCN and amounted to NOK 3m. Project owner was the Faculty of Medicine and Dentistry of the University of Bergen. Currently, one third of the world's population is infected with the bacterium *Mycobacterium tuberculosis* (*Mtb*), the causative agent of TB, but only part of these infections lead to actual disease. Whether the infection leads to disease is dependent on both the host and the pathogen. Especially the initial interaction between the pathogen and the host's cells is vital. This project examined this initial interaction to better understand the immune response, disease susceptibility and prognosis. Some of the research activities were linked to another project supported by GLOBVAC1 that aimed to prepare for TB vaccine efficacy trials (project number: 179342) in South India, creating synergies between the two projects.

Outputs and outcomes

The project has furthered our understanding of the initial host-pathogen interaction that leads to TB, and contributed to elucidating the role of non-tubercular mycobacteria in reducing the specificity of future diagnostic and predictive immune biomarkers relevant to TB management in high TB-endemic areas. It has, furthermore, contributed to the establishment of several new techniques at the University of Bergen. The grant recipient co-supervised a student from India (research activities linked to project 179342) who defended his PhD in Norway on Biomarkers of TB infection and disease, and another Norwegian medical research student. Besides supervising and training students, the project leader has contributed to the implementation of two genotyping techniques at the All India Institute of Medical Sciences in Delhi, India.

The project has contributed to several national and international collaborations. Collaborations were established with the National Institute for Medical Research (NIMR) in Tanzania, with the RIVM (National Institute of Public Health and the Environment) in the Netherlands, and with Haukeland University Hospital, Norway. Further, through the establishment of a high-throughput screening method at the laboratory of the University of Bergen, an international collaboration has been created between partners in Norway and India with the Leiden University Medical Centre. The partners in India and the Netherlands have also co-funded some of the research. Overall, this project has resulted in at least six scientific peer-reviewed international publications and various other articles, along with an invited lecture at the Third Global Forum on TB Vaccines (Cape Town, South Africa).

Relevance and durability

This project has created synergies with other projects that have received support from GLOBVAC. In addition to directly furthering knowledge on TB infection, this project has contributed to the global health research capacity at the University of Bergen. Although the Young Researcher who received the grant is no longer working in the field, the supervisor for this project, a tenured Professor at the University of Bergen (since 1996), continues to work in global health and is the recipient of substantial national and international funding for further studies in this field.

Case study 4: Advancing Rotavirus Vaccine Development (ARVAC)–BBIL Phase 3 Study (Project 209355, GLOBVAC1)

Background

This project concerned a phase 3 efficacy study of a rotavirus vaccine, called ROTAVAC®. Rotavirus is a common disease in children all over the world that can cause severe diarrhoea and even potentially lethal dehydration. In India alone, approximately 100,000 young children die each year from the virus, accounting for 22 percent of the total global deaths from rotavirus.[11]

This project was conducted by a consortium of Indian and international partners. Bharat Biotech, an emerging Indian vaccine manufacturer, invested important technical, manufacturing, and financial resources. Several international organisations supported the project with technical and financial assistance. RCN contributed 13 percent of the total funding of NOK 180m for the phase 3 study. The partnership was further supported by the Government of India's Department of Biotechnology (DBT), the Bill & Melinda Gates Foundation, and the UK Department for International Development. The trial began in March 2011 and enrolled 6,799 infants across three sites in India. The follow-up was completed in September 2013.

Outputs and outcomes

The study concluded that ROTAVAC® is efficacious in preventing severe rotavirus diarrhoea in low-resource settings: it significantly reduced severe rotavirus diarrhoea by more than half (56 percent) during the first year of life, with protection continuing into the second year of life. The vaccine efficacy compares favourably to that of currently licensed rotavirus vaccines in some low-resource countries. Also, compared to other rotavirus vaccines currently on the market, ROTAVAC® will be extremely affordable. In early 2014, the vaccine obtained licensure in India, and in July 2014 the Indian Prime Minister announced the introduction of the vaccine into the country's national immunisation programme. This move could prevent approximately one-third of rotavirus deaths and reduce medical treatment-related costs.[12]

The project has been applauded for its development process in which it combined international funding, international expertise and local capabilities to produce an affordable product for the developing world meeting high standards. Groups and individual scientists from 13 institutions contributed their expertise and technical assistance. Through technology and knowledge transfer this international public-private partnership has led to substantial capacity building at Indian institutions. The project has resulted in at least three articles in leading peer-reviewed journals and was reported well over 300 times in various media.[13]

Relevance and durability

The WHO recommends rotavirus vaccination in all countries and strongly recommends vaccination in countries with high diarrhoea-related mortality in children under five, including India. In light of the high costs and limited supplies of existing rotavirus vaccines, and the high number of rotavirus-related deaths, introduction of ROTAVAC® in the Indian national immunisation programme means the project will have created significant impact. Moreover, the manufacturer has begun discussions with WHO for prequalification, which could lead to an increased supply of a cost-effective rotavirus vaccine needed to meet global demand.

[11] Tate, J. E., Burton, A. H., Boschi-Pinto, C., Steele, A. D., Duque, J., & Parashar, U. D. (2012). 2008 estimate of worldwide rotavirus-associated mortality in children younger than 5 years before the introduction of universal rotavirus vaccination programmes: a systematic review and meta-analysis. The Lancet infectious diseases, 12(2), 136-141.

[12] Esposito, D. H., Tate, J. E., Kang, G., & Parashar, U. D. (2011). Projected impact and cost-effectiveness of a rotavirus vaccination programme in India, 2008. Clinical Infectious Diseases, 52(2), 171-177.

[13] Bhandari N, Rongsen-Chandola T, Bavdekar, A, et al. Efficacy of a monovalent human-bovine (116E) rotavirus vaccine in Indian infants: a randomised, double-blind, placebo-controlled trial. *The Lancet*. 2014. 383(9935):1236-2143. Bhandari N, Rongsen-Chandola T, Bavdekar, A, et al. Efficacy of a monovalent human-bovine (116E) rotavirus vaccine in Indian children in the second year of life. *Vaccine*. 2014. 32:A110-A116.; Bhan, M. K., Glass, R. I., Ella, K. M., Bhandari, N., Boslego, J., Greenberg, H. B., ... & Rao, T. S. (2014). Team science and the creation of a novel rotavirus vaccine in India: a new framework for vaccine development. *The Lancet*, *383*(9935), 2180-2183; Madhi, S. A., & Parashar, U. D. (2014). 116E rotavirus vaccine development: a successful alliance. The Lancet, 383(9935), 2106-2107.

Case study 5: Evaluation of Ebola vaccine safety and efficacy in Guinea. (Project 246662, GLOBVAC2)

Background

The Ebola outbreak that started in December 2013 in West Africa has been described as "the largest, longest, most deadly and most complex" Ebola epidemic on record.[14] The worst affected countries were Guinea (where the epidemic started), Liberia and Sierra Leone. The idea of creating a research consortium to test the safety and efficacy of existing vaccines in Guinea emerged during the WHO's high-level meeting on Ebola vaccines in October 2014.[15] The Norwegian Ministry of Foreign Affairs and Norad subsequently earmarked over NOK 20m for Ebola research and gave RCN the mandate for a rapid assessment without an open call. A consortium proposal, led by the Norwegian Institute of Public Health (NIPH), was approved in November 2014. Study objectives were to assess the efficacy, safety and effectiveness of the Ebola vaccine rVSV-ZEBOV, previously developed by the Public Health Agency of Canada, and licensed to NewLink Genetics and Merck. An additional NOK 156m in funding was secured from various international partner organisations.

The study was carried out in the five prefectures in Guinea where most of the cases had been reported by March 2015. The intended target group consisted of members of the local community who were in close contact with patients confirmed to have Ebola. It hereto followed a ring vaccination model similar to the one used to eradicate small pox. In addition, the study also aimed to assess the immune response and safety of the vaccine in frontline workers in the study prefecture. Intended enrolment approximated 10,000 participants. The interim analysis included a population of over 7,600 people. The study was conducted in close engagement with local communities and authorities, and aimed to increase the local capacity to conduct high quality research in Guinea.

Outputs and outcomes

Interim analysis has demonstrated that the rVSV-ZEBOV vaccine is both highly efficacious and safe in preventing Ebola, and is effective at the population level when delivered during an outbreak. The vaccine has not yet been officially approved, but is available under an 'extended access programme'. The research project has so far resulted in two high-profile publications and numerous news items.[16,17] Further publications are still expected.

Relevance and durability

Despite its complexity, the project was successfully taken from concept to delivery in just 9 months, an unprecedented achievement, aided by the rapid response mechanism of RCN. The project has also built new knowledge and research capacity about Ebola and related immunology in Norway. It is expected that the extended partnership that was developed during the project will in some form be used to combat new diseases in the future.

The success of the research project has raised the international profile of the entire research team and funders involved in the Ebola vaccine trials, including the Norwegian Ministry of Foreign Affairs.

[14] http://www.who.int/dg/speeches/2015/princeton-ebola-lessons/en/

[15] http://www.who.int/mediacentre/news/ebola/23-october-2014/en/

[16] The ring vaccination trial: a novel cluster randomised controlled trial design to evaluate vaccine efficacy and effectiveness during outbreaks, with special reference to Ebola (2015) Ebola ça suffit ring vaccination trial consortium. BMJ 351:h3740. doi: 10.1136/bmj.h3740

[17] Efficacy and effectiveness of an rVSV-vectored vaccine expressing Ebola surface glycoprotein: interim results from the Guinea ring vaccination cluster-randomised trial (2015) Henao-Restrepo et al. The Lancet. 386:857–866. http://dx.doi.org/10.1016/S0140-6736(15)61117-5

3 Mid-term evaluation of GLOBVAC2 (2011-2015)

In this chapter we present a more detailed mid-term assessment of the first half of the second GLOBVAC programme (GLOBVAC2, 2011–2015). The chapter presents a narrative summary of data obtained from project and programme documents (including financial data), survey responses, interviews with project leaders and other stakeholders, as well as the findings of an independent Expert Panel.

3.1 Funding allocation

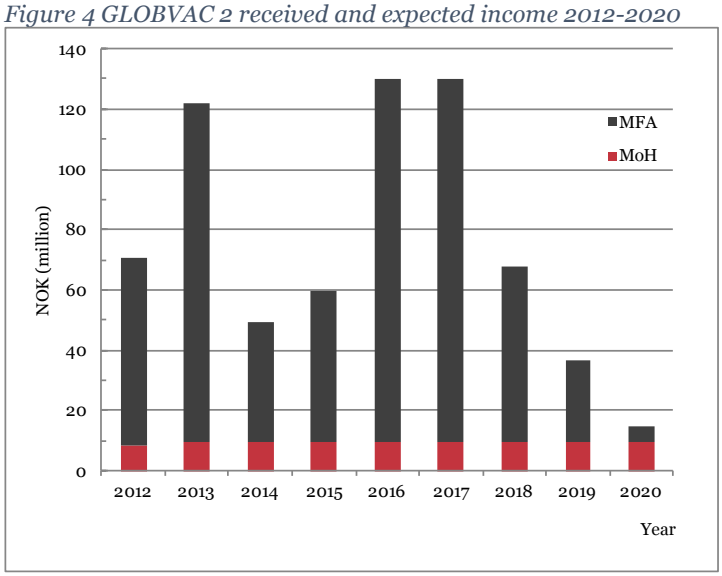
In the revised programme plan for GLOBVAC2, the annual budget for the programme for the period 2012–2020 was set to NOK121.8m.[18] Of this, NOK112m were to be provided by the Ministry of Foreign Affairs (MFA)/Norad and NOK9.8m by the Ministry of Health and Care Services (HOD). The programme plan also states that activities that are motivated mainly by a development perspective should be funded by the MFA/Norad, while activities that are motivated by a global/international perspective should be co-funded by the HOD. In addition, NOK10m was transferred from GLOBVAC1 to GLOBVAC2.

Several further adjustments to the budget were subsequently made. First, instigated by the Ebola outbreak in West Africa in 2014, RCN reassigned approximately NOK22.7m from the MFA/Norad funding to Ebola vaccine development. It was decided that applications from research groups in this particular area must be processed quickly by the GLOBVAC Programme Board and that involvement of Norwegian researchers with relevant competence was considered positive but not necessary, and lack thereof should not delay the process. This earmarked allocation was to be deducted from future allocations from Norad. Also, since GLOBVAC had a budget underspending and did not need more funding at the time, RCN and MFA/Norad agreed to postpone a substantial part of the remaining 2014 allocation, which is to be compensated for in future years. Whilst these changes affect annual disbursements from 2014 onwards, they had no net effect on the overall MFA/Norad contribution to the programme.

The MFA has committed a further NOK380m in funding for ongoing and approved research projects for the period 2015–2020, conditional on approval by the Norwegian Parliament. The allocations received up to 2014, together with expected allocations (updated) for the remainder of the programme (2015–2020) are shown in Figure 4. The MFA will in 2016 come back with clarifications on potential additional allocations beyond this for the remaining programme period. Such future allocations and disbursements are contingent on the findings of this evaluation.

[18] RCN –GLOBVAC ”Work programme 2012-2020 (Revised January 2014)

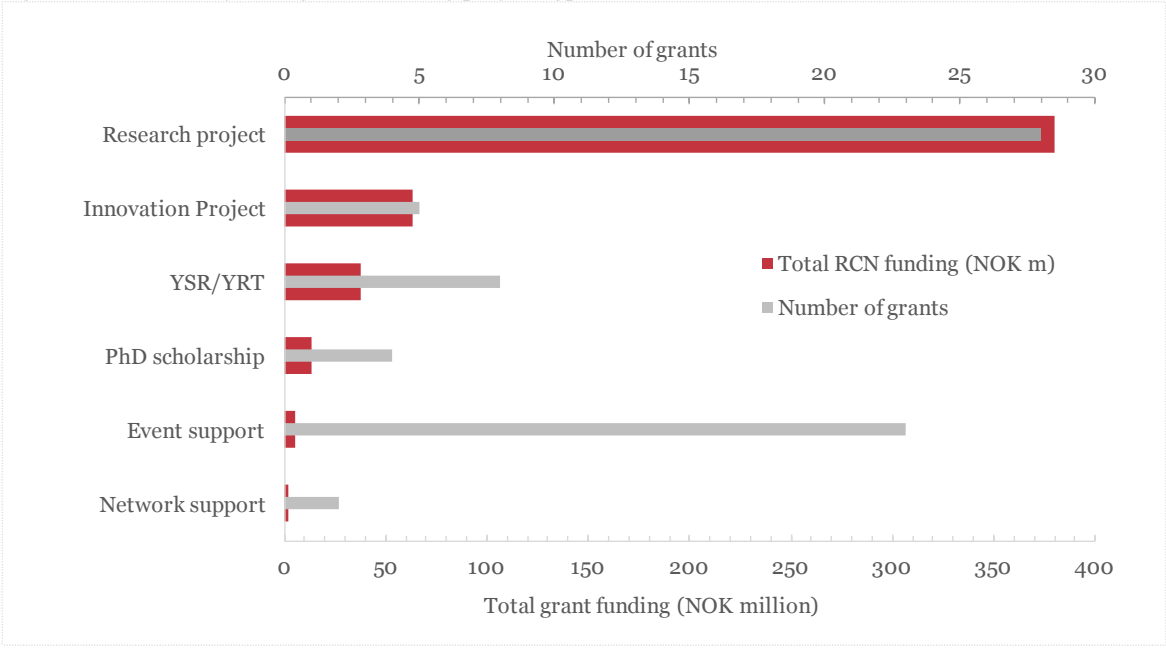
Figure 4 GLOBVAC 2 received and expected income 2012-2020



Source: Technopolis Group (2016), based on data provided by RCN. Expected income is based on the latest funding allocation letter from 2015.

There are at present 70 different projects in the GLOBVAC2 portfolio (plus 6 contracts under negotiation). These include research projects (28), innovation projects for the industrial sector (5), young scientist/young researcher talent grants (8), PhD scholarships (4), event support grants (23), and network support grants (2)(Figure 5). A large majority of the funding (76 percent) is allocated to research projects, with an average grant size of NOK13.6m (ranging from NOK 2.8m to 36.5m). By comparison, the event support grants average NOK235k each. Thus far, eight of the funded activities have been finalised (one in 2012, two in 2013 and five in 2014); all others are still ongoing.

Figure 5 GLOBVAC2 funding allocation by project type

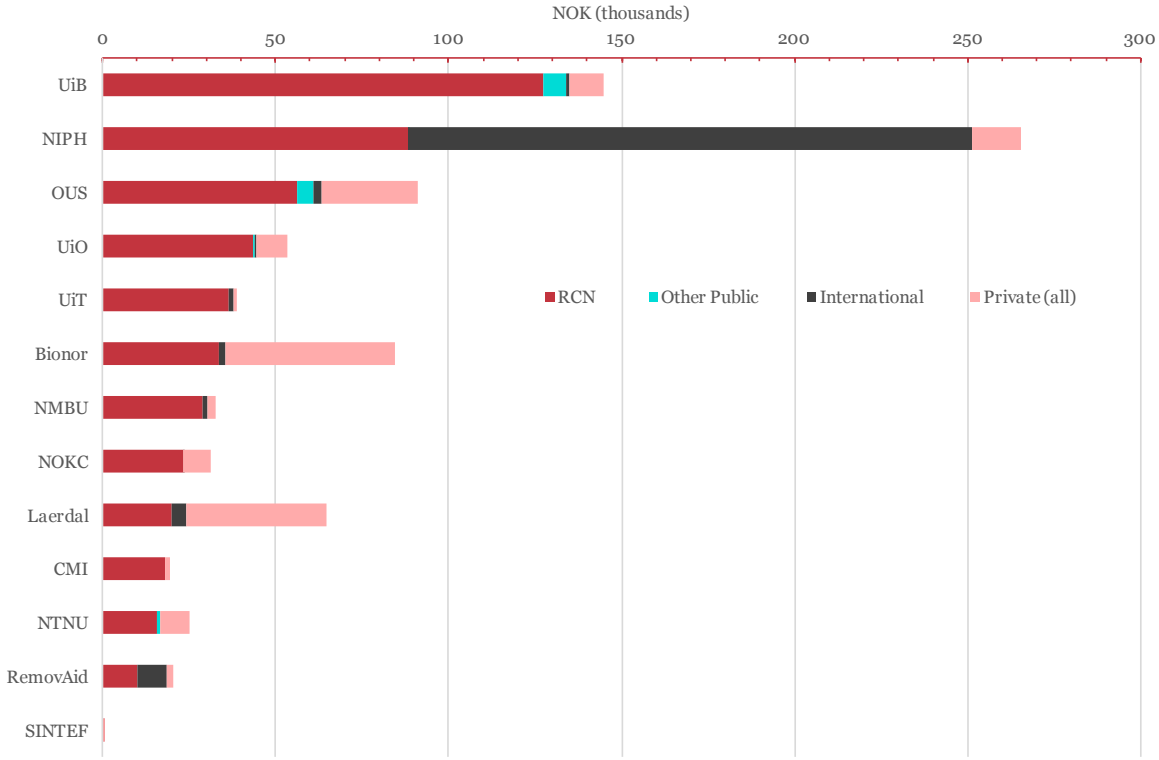


Technopolis Group (2016), based on data provided by RCN

Figure 6 shows the institutions that have received, or have been awarded programme funding. As with GLOBVAC1, the UiB (NOK127m) is the largest recipient, followed by the Norwegian Institute of Public Health (NOK88m). Most of the GLOBVAC2 recipients also received funding in GLOBVAC1, but there are two new institutions, namely Laerdal Global Health AS and RemovAid AS. The first is a Norwegian non-profit company that develops products for mothers and newborns in low-resource countries. The second is a Norwegian start-up with a particular focus on reproductive health. Compared to GLOBVAC1, organisations classified as industry receive a significantly larger share of the budget (13 percent in GLOBVAC2 vs 3 percent in GLOBVAC1), whereas the share allocated to universities remains similar (61 vs 63 percent).

Many of the funded projects also have sources of funding other than RCN, such as other public research grants, industry funding or other forms of support. In particular, the NIPH has received a large amount of international funding for its development of a meningococcal vaccine and the Ebola vaccine trial. The projects led by Bionor and Laerdal are both characterised by significant contributions from private funds.

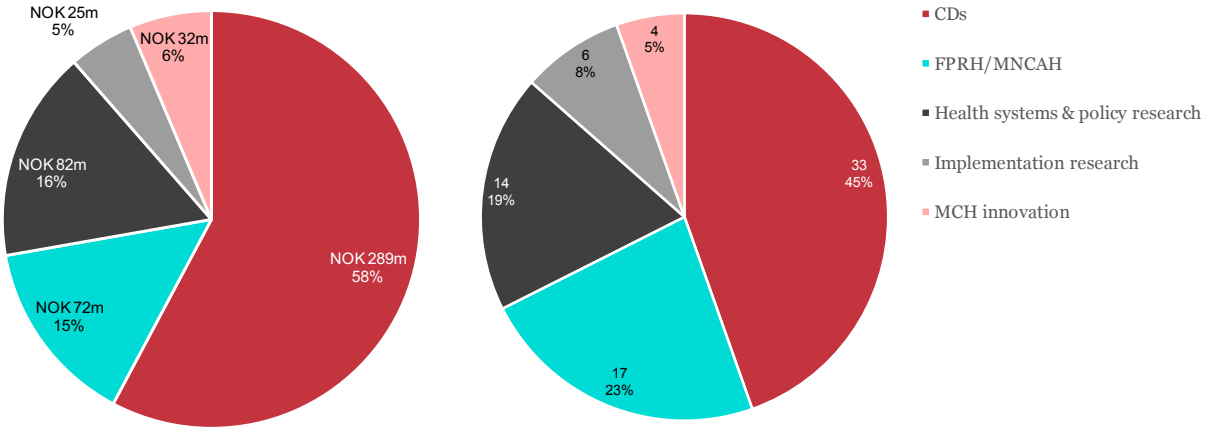
Figure 6 Funding composition for GLOBVAC2 supported projects



Source: Technopolis Group (2016), based on data provided by RCN

Although RCN has strived for a balanced allocation of projects across all thematic priority areas, the scientific quality was an overriding consideration and project calls were not narrowly defined to correspond to unique thematic areas. For the purpose of this evaluation the 70 projects in GLOBVAC2 were classified according to the five thematic priority areas. Figure 7 shows the distribution of RCN funding across the thematic areas, by funding amount (left) and by number of grants (right). Nine projects could not be assigned to a single priority area, as they were considered equally relevant to two areas. For analytical purposes, total funding to these projects was split equally between the areas, whereas the project was counted under each thematic area. Network support grants were excluded from the analysis, as these could not be classified.

Figure 7 Distribution of GLOBVAC2 funding across thematic areas, by funding (left) and number of grants (right).



Source: Technopolis Group 2016, based on data and categorisation by RCN. (CDs = Prevention and treatment of, and diagnostics for, communicable diseases; FPRH/MNCAH = Family planning, reproductive, maternal, new-born, child and adolescent health; MCH innovation = Innovation in technology and methods development for maternal and child health)

The thematic area "Prevention, treatment, diagnostics communicable disease" is the largest in the portfolio, both in terms of funding (58 percent) and of the number of grants (45 percent, at 33 grants). It is followed by "Family planning, reproductive, maternal, new-born, child and adolescent health" and "Health systems and policy research". The "Implementation research" and "Innovation and technology and methods development for maternal and child health" areas are by comparison much smaller. Discussions with members of the Programme Board confirmed that relatively few applications in these categories had been received.

Thus far, RCN has disbursed or granted close to NOK500m in GLOBVAC2, amounting to approximately 80 percent of all thus far committed allocations. In addition, the programme has set aside funds for calls for proposals started in 2015 ('game changing' projects, PhD scholarships and a graduate school), as well as some administrative and programme running costs. Available funds for future calls for the remainder of the programme (2016–2020) will depend on the results of this evaluation.

3.2 Output analysis

As this report presents findings from a mid-term evaluation and only a minority of projects funded through GLOBVAC2 have thus far been finalised, an analysis of the scientific output cannot yet provide an accurate overview of the expected output of the programme. Nonetheless, it is worthwhile to review the progress to date. Table 3 summarises key output data, summarised by RCN from the most recent progress reports (or final reports for completed projects) for the 70 projects in the GLOBVAC2 portfolio.

Table 3 Summary of outputs generated from GLOBVAC2 research projects

Category	Type of output	Number
Scientific / scholarly publications	Articles in scientific/scholarly journals or series	130
	Articles in anthologies	6
	Monographs	5
	Total	**141**
Dissemination for users & the general public	Reports, memoranda, presentations at meetings/conferences	374
	Popular science (eg articles/books for general audiences, exhibitions)	46
	General media (eg newspapers, radio, TV)	10,842
	Total	**11,262**

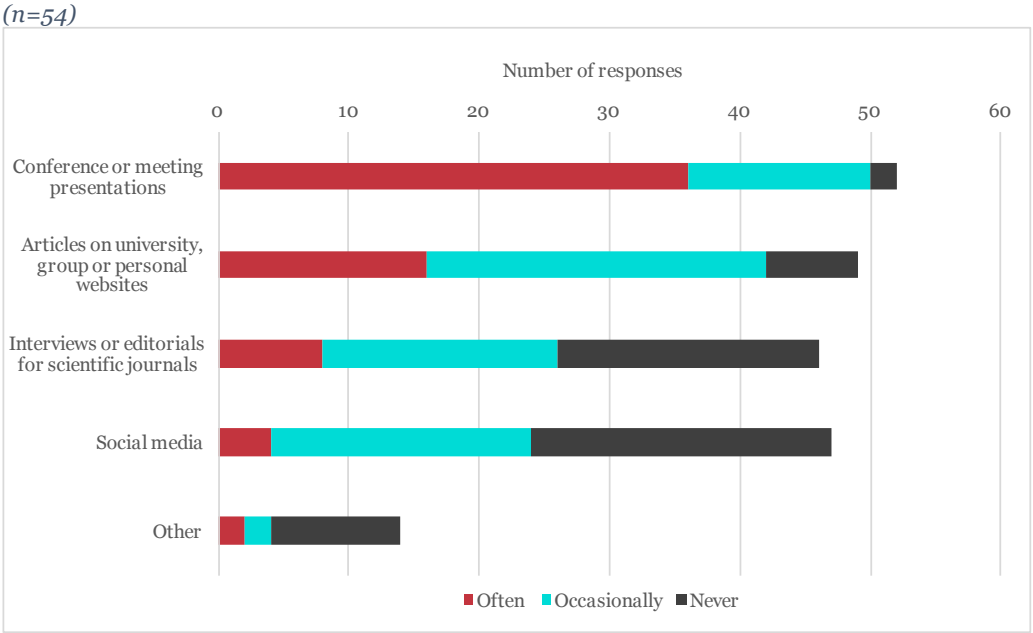
Value creation (Introduction of new/improved ...)	Work processes or business models by companies participating in the project	0
	Methods, models or technologies by companies participating in the project	4
	Methods, models or technologies by companies external to the project	1
	Total	**5**
Commercial results (Finalisation of new/improved ...)	Products	5
	Processes	0
	Services	0
	Methods/models/prototypes	10
	Total	**15**
Industry oriented R&D results	Licensing agreements signed	1
	Patents registered	4
	Total	**5**
New business activity	New companies launched as a result of the project	0
	New businesses areas in existing companies as a result of the project	0
	Total	**0**

Source: Technopolis Group (2016), based on data provided by RCN.

The 45 projects with a clear research focus (ie 28 researcher projects, 5 innovation projects, 4 PhD scholarships, and 8 young scientist/young researcher talent grants) have jointly produced 141 articles in scientific journals, and a further 11 in anthologies and monographs. This amounts to an average scientific output of over 3 articles per project, a respectable output considering the fact the majority of projects are still ongoing. However, as for GLOBVAC1, the results are skewed in that just four projects account for 79 (56 percent) of these articles. Amongst ongoing projects, 24 have not yet resulted in any scholarly publications. Given that a number of these projects have only been ongoing since late 2014, and the lag time between research findings and publications, this is not unexpected.

Survey respondents across both programmes indicate that presentations, particularly scientific conferences, are commonly used to disseminate findings to the wider scientific community (Figure 8). Other channels, such as web articles and social media (eg Twitter, LinkedIn, Facebook pages) are much less commonly used for this purpose.

Figure 8 Use of channels for knowledge dissemination to the scientific community based on survey responses (n=54)



At first sight, the data presented in Table 3 show a startlingly high number of reports in general media, but this can be explained by just two projects. The successful Ebola trial generated enormous media

attention and its lead researchers report more than 10,000 reports in print and online media, radio and television. Building on the results of the first phase of the project, the Vacc-4x study also continued to receive a large amount of attention during GLOBVAC2.

Translation and valorisation of research findings into tangible products or activities have not yet taken place on any significant scale, though this is unsurprising at the current point in time. The four registered patents are assigned to Laerdal and RemovAid, companies focused on methods development and market introduction of innovations. Two lead investigators involved in projects where patentable IP has been generated or is expected, provided survey responses that indicate that they intend to safeguard access to the IP for people in LLMIC through licensing agreements. There were no reports of any IP having been deposited in patent pools.

3.3 Programme achievements

3.3.1 Strengthening the Norwegian capacity for global health and vaccination research

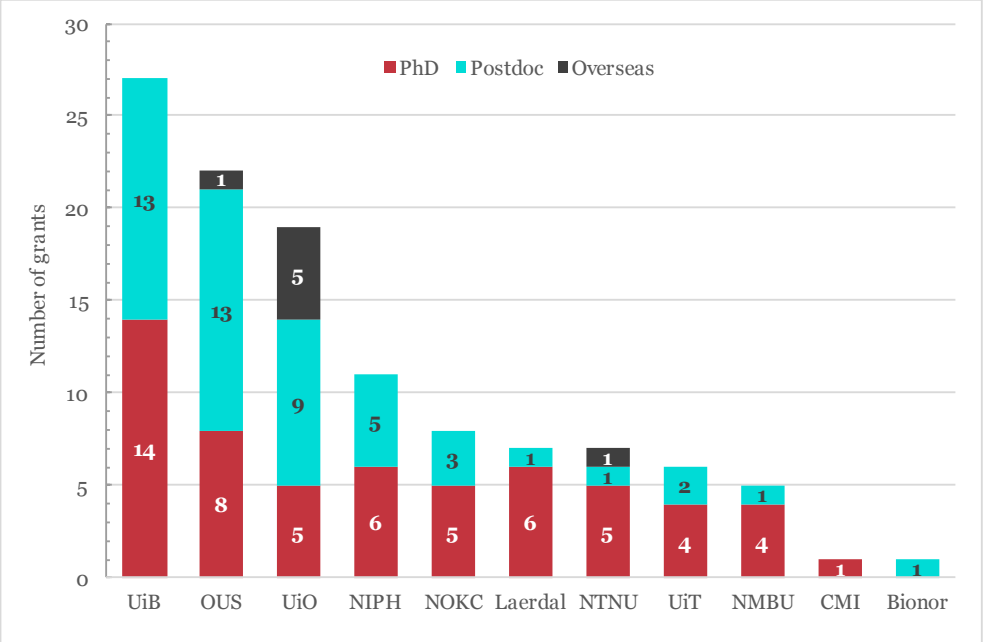
Unlike countries like the United Kingdom, Norway does not have a long-standing tradition of global health and vaccination research. Although the Norwegian government has long been an important funder of health and development programmes in LLMICs, and a contributor to, for instance, GAVI and product development partnerships, the amount of research conducted in Norway prior to the programmes was relatively small and confined to a small number of institutions. Within the Norwegian global health community, it was felt that a national knowledge base was needed, but within existing research funding programmes there was little or no earmarked support for GHR. One of the main goals of the GLOBVAC programmes has thus been to strengthen this knowledge base by making dedicated funding available.

This is a new research area at my organisation and the GLOBVAC grant was somewhat of a landmark for establishing the research area at my institute. (GLOBVAC project leader)

Nearly all stakeholders agree that the GLOBVAC programme has been a major catalyst in promoting GHR in Norway, and has contributed to capacity development. It has done so by supporting a significant number of young researchers and established investigators, by fostering greater exchange of knowledge and skills amongst research groups, and by supporting the establishment of research networks. Based on project data for ongoing and finalised projects under GLOBVAC2, to date the programme has provided funding for 58 PhD scholarships, 49 postdoc positions and 7 grants for students to work overseas (Figure 9).[19] As expected, the largest numbers of students have been supported at the Universities of Bergen and Oslo.

[19] Note that this funding is integrated into the project funding in the form of researcher projects, innovation projects or YSR/YRT grants and the actual grant amounts cannot be extracted.

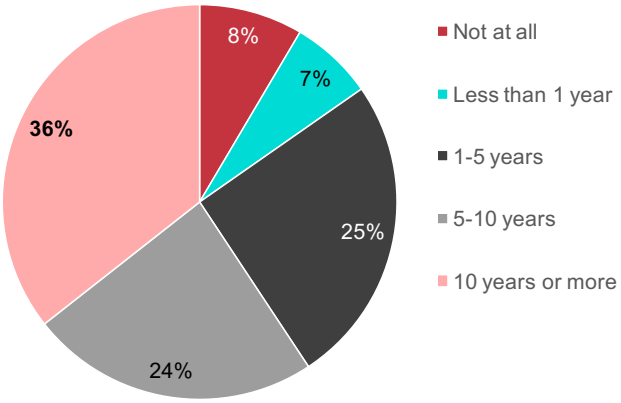
Figure 9 Researcher support under GLOBVAC2 funded projects



Several interviewees indicated that the programme has been instrumental in the creation of, for instance, the Centre for Intervention Science in Maternal and Child Health (CISMAC) and in the strengthening of capacity at the NTNU. Furthermore, contingent on support from GLOBVAC, the establishment of a new national graduate school for global health coordinated by NTNU is planned in 2016.

Aggregate survey data indicates that the programmes primarily attracted researchers with some experience in global health and vaccination research. The majority of project leaders (59 percent of respondents) had already been working in this field for at least five years prior to applying for programme funding. Around a quarter of respondents had some, though not extensive, experience of between one and five years. Nonetheless, the programmes were also able to reach project leaders with no, or less than one year of experience in the field (15 percent).

Figure 10 Project leaders' experience in global health & vaccination research prior to GLOBVAC funding (n=59)

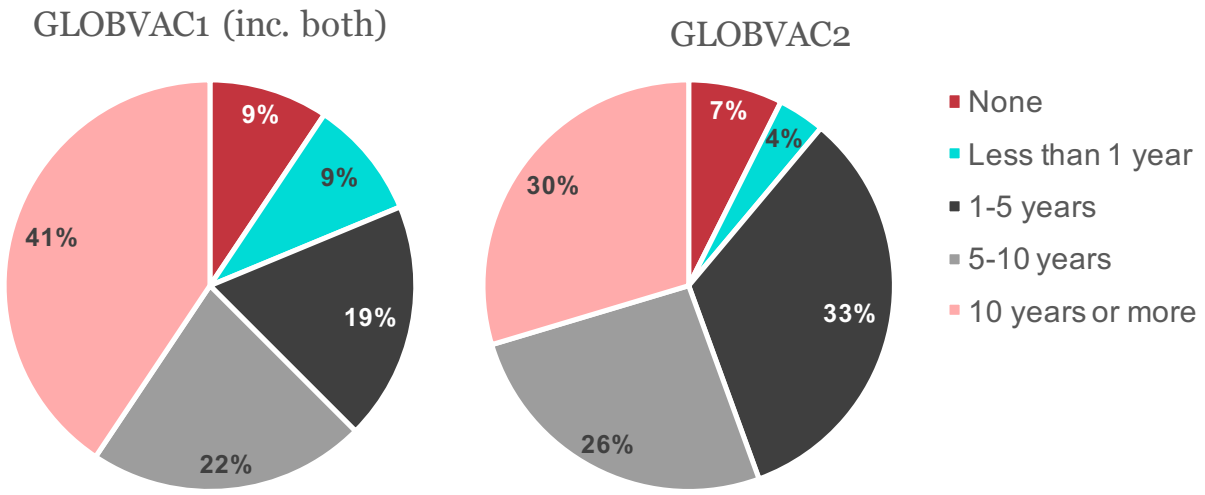


The relative representation of project leaders with less than one year experience was somewhat higher among those who received funding for the first time through GLOBVAC1[20] (18 percent) than among

[20] This includes survey respondents who indicated receiving funds under GLOBVAC1 only and those who received funds under both GLOBVAC1 and GLOBVAC2.

those who only received funding through GLOBVAC2 (11 percent), suggesting that GLOBVAC1 has had a somewhat more pronounced impact on attracting new researchers to the field than its successor (Figure 11).

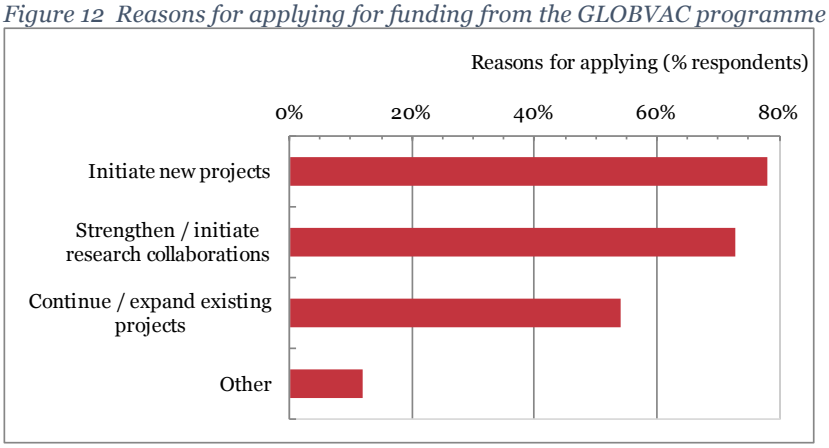
Figure 11 Project leaders' experience in global health and vaccination research prior to GLOBVAC funding



Technopolis (2015). Note that the left figure shows the combined results for all project leaders who received funding for the *first* time under GLOBVAC1, and includes those leading projects in both GLOBVAC1 and GLOBVAC2. Percentages shown are relative to the total number of responses in each of the programme categories respectively (n=32 for GLOBVAC1, n=27 for GLOBVAC2).

Consistent with the fact that many project leaders reported previous experience in the field, 73 percent of all survey respondents gave professional interest and expertise in the field as their most important reason for participation in GLOBVAC, whereas their decision was rarely influenced by the (lack of) funding in other areas of research. A desire to contribute to issues of pressing societal need, particularly for people in developing countries, was frequently cited as an important factor in the decision to engage in global health and vaccination research in general, and to participate in GLOBVAC in particular. In most cases (78 percent) GLOBVAC support was requested for initiating new research activities, but funding was also frequently used to continue or expand ongoing research activities and to strengthen partnerships (Figure 12). Other reasons cited include the opportunity to apply existing expertise to a new area, support for collaboration with and capacity development in LLMICs and the potential to leverage GLOBVAC funding to attract additional resources.

Figure 12 Reasons for applying for funding from the GLOBVAC programme (n=59, multiple answers possible)

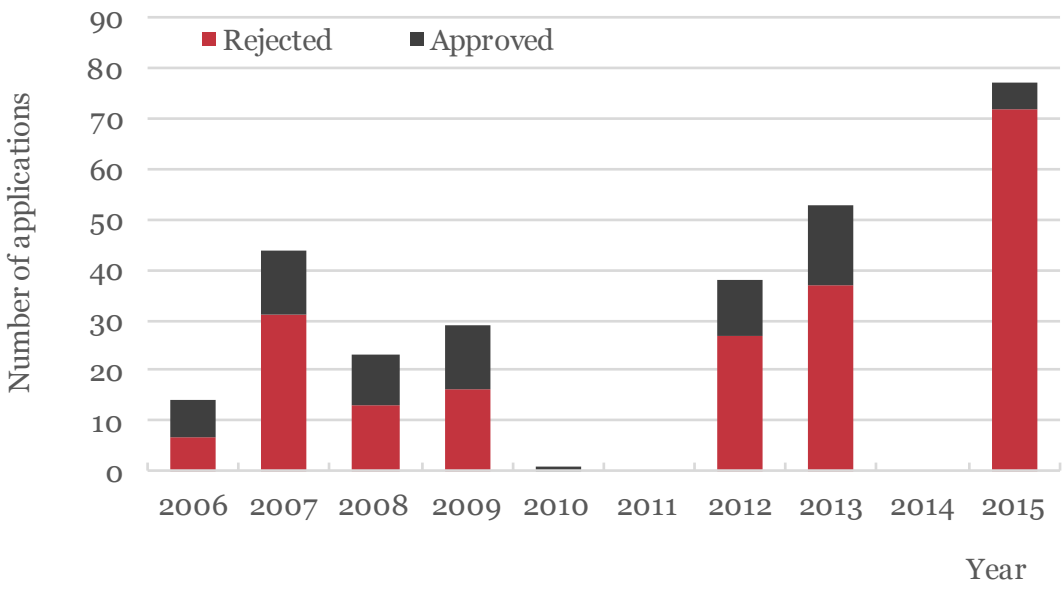


For many project leaders, the programme does not appear to have directly led to a career advancement as for 56 percent of respondents their employment position had not changed in the funding period. This may be indicative of the relatively senior position many of these researchers already held within their institutes. However, a number of researchers did receive a promotion (4 percent) or were offered a permanent position (14 percent); over half of them attributed this change moderately to strongly to their participation in the GLOBVAC programme.

> *First the GLOBHEL (sic) and then the GLOBVAC project spearheaded my career as an independent scientist and as group leader of a group that now is fully focused on global health research. (GLOBVAC project leader)*

The success of the programme in generating interest for the field of global health and vaccination research is apparent in the fact that over time the number of applications for research projects has shown a marked increase, from 23 applications for the first funding call to 77 in the most recent one (Figure 13). It should be noted that the number of applications that can be approved is capped by the funding envelope of the call and that the share of approved versus rejected applications should thus not be taken as a measure of quality. In fact, the Programme Board has stated that over time they observed an increase in the quality of applications, as reflected by higher average marks awarded by the proposal reviewers.

Figure 13 Number of applications (rejected and approved) for researcher projects under GLOBVAC[21]



Source: Technopolis Group (2016), based on data provided by RCN

Another positive signal about the sustainability of the increased interest and expertise in the field of global health and vaccination is that 74 percent of all respondents indicated they will certainly continue working in this field, with a further 18 percent saying they are likely to do so. Nonetheless, many of these researchers remarked that continuation in the field is contingent upon continued availability of funding. Qualitative statements provided by survey respondents suggest that in particular senior researchers are very committed to the field, whereas for more junior researchers their

[21] The relatively high number of applications in 2007 is, in part, because there were two calls for proposals that year. In 2011 and 2014, there were no calls for research projects. In 2015, the call was for large 'game-changing' projects without a stated cap. Therefore, the applications far exceeded the available funding and only a small number of proposals could be approved.

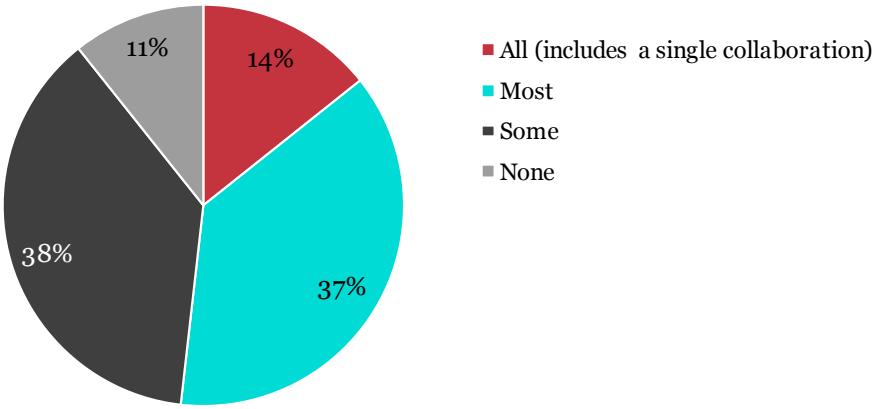
sustained interest in the field is more dependent on whether they are able to obtain sufficient funding to continue their efforts in this field.

Several investigators indicated that their participation in the GLOBVAC programme boosted their visibility and credibility in the field, and that this in turn has helped them attract additional research funding and create partnerships. Nonetheless, one interviewee suggested that, although great strides have been made, in general Norwegian research in the field is not yet ready to compete at the international level and that further capacity development is required. This opinion was shared by a number of members of the Programme Board who similarly feel that Norway has not yet achieved a sustainable critical mass of researchers, in particular of researchers at an early stage of their careers.

3.3.2 International research collaborations and partnerships

One area in which the programme appears to have been particularly successful is in supporting the creation of research collaborations and partnerships, both within Norway and with institutions abroad. Amongst survey respondents, all but two (97 percent) had collaborated with other research groups or institutions. Of these, 70 percent had collaborated with one or more institutions in Norway and with one or more abroad. A further 27 percent had collaborated exclusively with institutions abroad and four percent of investigators had collaborated only with other Norwegian institutions. Many of these collaborations were new and a direct result of GLOBVAC, underlining the remarkable achievement of the programme in encouraging greater collaborations (Figure 14).

Figure 14 New collaborations formed as a direct result of the GLOBVAC programme (n=56)



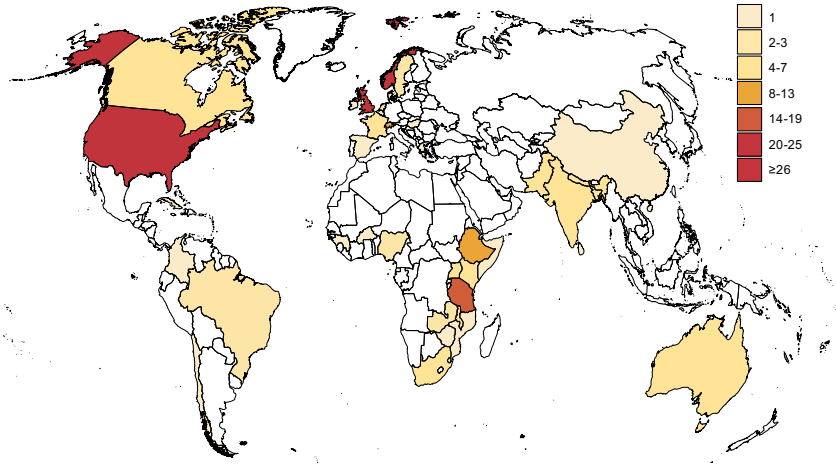
The large majority of collaborations included other universities or research institutes (96 percent), as well as other publicly funded institutes (66 percent). Involvement of the private sector was more modest, but still 23 percent of respondents indicated having collaborated with private institutions or companies. Other noted collaborating partners included hospitals, non-governmental organisations, ministries of health in LLMICs, and the World Health Organisation.

The main reasons given for the formation of collaborations were the need for bringing together complementary expertise, accessing new research methods and techniques, and in particular an emphasis on working with local institutions in the target countries in the South.

Project data provided by RCN include a list of partner institutions with which partner agreements have been signed by funding beneficiaries. Analysis of this data confirms a high degree of collaboration between Norwegian institutions, with 42 Norwegian partner institutions listed (some of whom are grant beneficiaries themselves). In addition, there are 171 collaborating partners listed outside Norway. The majority of these are found in Europe (60), in particular in the United Kingdom (Figure

15).[22] Institutions in the USA (23), Canada (4) and Australia (4) also collaborate with GLOBVAC beneficiaries. As discussed in more detail in the following section, there are also numerous partnerships with institutions in LLMICs, throughout Africa (55), Asia (17), Latin America (5) and the Middle East (3).

Figure 15 Location of collaborating institutions on GLOBVAC2 projects



Africa		**Europe**	
Tanzania	14	Norway	42
Ethiopia	9	United Kingdom	26
Kenya	6	Switzerland	9
Uganda	6	Denmark	7
Malawi	5	Netherlands	6
South Africa	4	France	5
Nigeria	2	Sweden	2
Zambia	2	Belgium	1
Burkina Faso	1	Greece	1
Comoros	1	Hungary	1
Guinea	1	Ireland	1
Mozambique	1	Spain	1
Somalia	1		
DR Congo	1	**Latin America**	
Zimbabwe	1	Brazil	2
		Chile	1
Asia		Colombia	1
India	6	Cuba	1
Pakistan	4		
Nepal	3	**Middle East**	
Bangladesh	2	Palestinian territories	3
China	1		
Sri Lanka	1	**North America**	
		USA	23
Australia		Canada	4
Australia	4		

Interviewees were generally very enthusiastic about GLOBVAC's influence on the interaction between research groups within Norway. It was felt that there is, at present, a very strong sense of community and that groups are truly working together to help further the state of the field. The collaborations with institutions in Europe and the US have further helped build the capacity of Norwegian researchers and have strengthened Norway's international position in the GHR community. Nonetheless, members of the Expert Panel noted that there is a need for greater interdisciplinary collaboration –particularly between the medical and social sciences – and that this should be more clearly emphasised by RCN in the call for proposals. Additionally, Panel members remarked that there appears to be limited Scandinavian collaboration, and feel this may be a missed opportunity as the GHR infrastructures are rather similar in Scandinavia. For example, a research school for Global Health has existed in Sweden for 10 years, whilst a new one is now planned for Norway, seemingly without coordination or collaboration between the two.

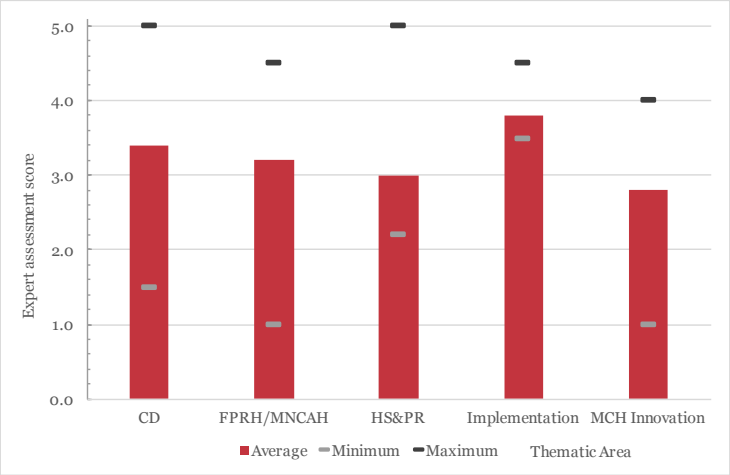
3.3.3 Capacity development in low- and lower-middle income countries (LLMIC)

The extent to which the programme has impacted capacity development in LLMIC is somewhat hard to assess. As evidenced by Figure 15, many of the research projects include partners in these countries, particularly in Eastern and Southern Africa, and to a lesser extent in South Asia. It is likely that, by virtue of collaboration, researchers in the partner institutions benefit from training and knowledge transfer. These researchers have also frequently attended events and meetings organised by GLOBVAC and by partner institutions. To stimulate involvement of local researchers, GLOBVAC allows funding to flow to local institutions in various ways. First, the Young Researcher Talent grant allows young researchers from LMICs to apply for funding of their own project. They must be collaborating with a Norwegian Institution, but they can (and preferably should) perform the research in their home country. Furthermore, although RCN stipulates that project owners must be Norway-based

[22] A particular noteworthy partner is the London School of Hygiene & Tropical Medicine, which is partner in nine projects.

institutions, researchers from LMICs can act as (co-)principal investigators and there is no limit on the funding that can go to partners in LMICs. Field visits by members of the GLOBVAC Secretariat and Programme Board to projects in Tanzania and Ethiopia illustrated this strong local commitment. Members of the Expert Panel also feel the capacity building component in the applications is mostly taken seriously and backed by good supervision from the Northern partners. They rated the portfolio as overall adequate to good on this dimension, but noted some negative exceptions in the areas of family planning and reproductive health, as well as in innovations for maternal and child health (Figure 16).

Figure 16 Expert assessment of the capacity development activities of the portfolio per thematic area



Source: Technopolis Group (2016), based on data provided by the Expert Panel. (Note that minimum and maximum scores are based on the averaged scores per proposal). 1 = very low; 2 = low; 3 = adequate; 4 = high; 5 = very high.

Nonetheless, the exact roles and responsibilities of the partner institutions in the projects could not be determined from the available data, so it is difficult to determine how widespread these benefits are and to what extent a truly sustainable capacity has been developed in LLMICs. This would require further assessment through additional interviews with project leaders and representatives from the partner institutions, but this was beyond the scope of this evaluation.

Some interviewees have suggested that the current focus of the programme is still primarily, and possibly too much, on supporting Norwegian researchers who are conducting parts of their research abroad, rather than on supporting local researchers in LLMICs. An additional consideration is the fact that GLOBVAC support is tied to specific projects and is therefore necessarily limited in time. The programme is thus not geared towards longer-term sustainable capacity development in LLMICs but rather towards project-specific knowledge transfer. Some members of the Programme Board and other stakeholders have therefore voiced reservations about this potentially overly ambitious goal of capacity building in the programme, and have raised the question whether other mechanisms of support would not be more suitable, either under the governance of GLOBVAC, or alongside it. It could do so, for instance, by alignment with NORHED/Norad supported programmes for capacity development, and by collaboration with local ministries of health and education. The downside of ring-fencing GLOBVAC funds for longer-term capacity development in specific countries would be that it would reduce the programme's flexibility to expand into new geographic areas and/or would negatively impact some existing partnerships outside of this new scope.

Lastly, several interviewees have remarked that the potential for impact in terms of capacity development is very context-dependent and that not all projects have been equally successful at this, often for reasons beyond the control of the project leader.

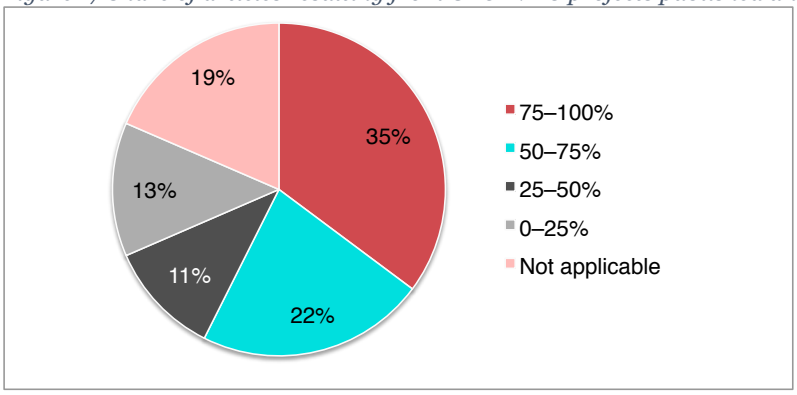
3.3.4 Increasing awareness about the needs for and results from global health research

Although the primary emphasis of the programme has been on supporting research and capacity development, one of the goals has also been to promote awareness about the needs for GHR amongst researchers, funders and policymakers. Achieving this goal relies on information activities, such as events and meetings, but also on the dissemination efforts of supported researchers.

Most interviewees felt that the programme has in fact contributed to an increased interest in GHR in Norway. This has in turn translated into further political and financial support, and more thoroughly embedding GHR in various research institutions. In the new Norwegian health care strategy, HelseOmsorg21, "Meeting global health challenges" has been defined as one of the ten strategic initiatives.[23]

In terms of knowledge sharing with researchers in LLMICs, it is noteworthy that a majority of survey respondents (57 percent) indicated that over half of their articles had been published under open access (OA) conditions (Figure 17).

Figure 17 Share of articles resulting from GLOBVAC projects published under OA conditions

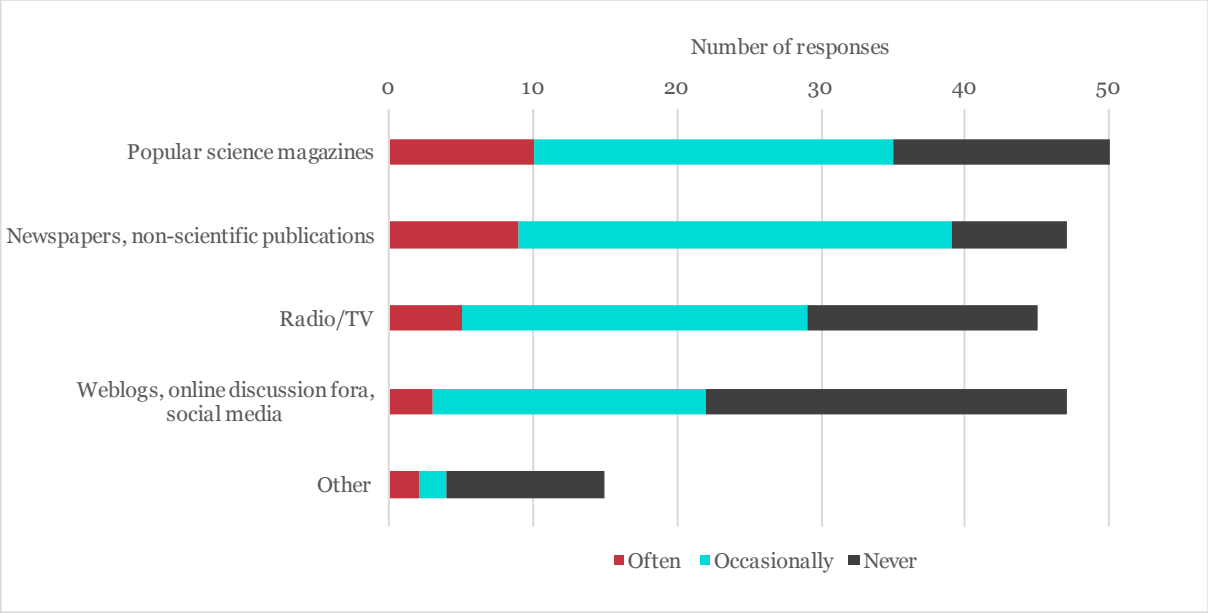


Many of those who have expressly chosen to use OA felt it important to guarantee access to project outputs for researchers and policy makers in LLMICs. The predominant reasons cited for not publishing under OA conditions were a focus on the cost of OA charges, and a perceived lack of quality and prestige of many OA journals in comparison to some of the more prominent established journals.

Sections 2.2 and 3.2 have already highlighted some of the ways in which the GLOBVAC programme has contributed to increased public awareness about the needs for GHR. In response to a survey question about which channels researchers had used to share their findings with the general public, over half indicated at least occasionally using popular science and non-scientific publications, as well as traditional media (eg radio, TV)(Figure 18). Despite their relative ease of use, social media channels are less popular amongst project leaders as a means for communicating with broader audiences. Other channels reported were policy briefs, seminars, (institutional) websites, and press releases (for projects where the lead institution is a company). Several high profile projects, in particular the successful development of an Ebola vaccine, have had significant exposure in national and international media. It is hoped that such attention will help attract additional investments in GHR in future.

[23] Health&Care 21 Action list (3 December 2015), Research Council of Norway. Available at http://www.forskningsradet.no/prognett-helseomsorg21/About_HelseOmsorg21/1253985487364.

Figure 18 Use of channels for knowledge dissemination to the general public by survey respondents (n=53)



In addition to the efforts made by principal investigators to showcase their research, the GLOBVAC Secretariat also has been actively engaged in discussions with national and international policymakers, funding organisations and stakeholders in the field of global health to increase the visibility of the programme and of GHR efforts in Norway. GLOBVAC provides the alternate representative from Norway to the General Assembly of EDCTP and is working closely with EDCTP to identify opportunities for Norwegian researchers (not limited to GLOBVAC funded projects) to provide added value to the second programme of EDCTP (EDCTP2). Additionally, the annual GLOBVAC conference has developed into an important forum for networking between Norwegian and international researchers, including those from LMICs, and policy makers. It is important that these efforts are continued and, where possible, strengthened to further increase the visibility of GLOBVAC among national and international decision-makers.

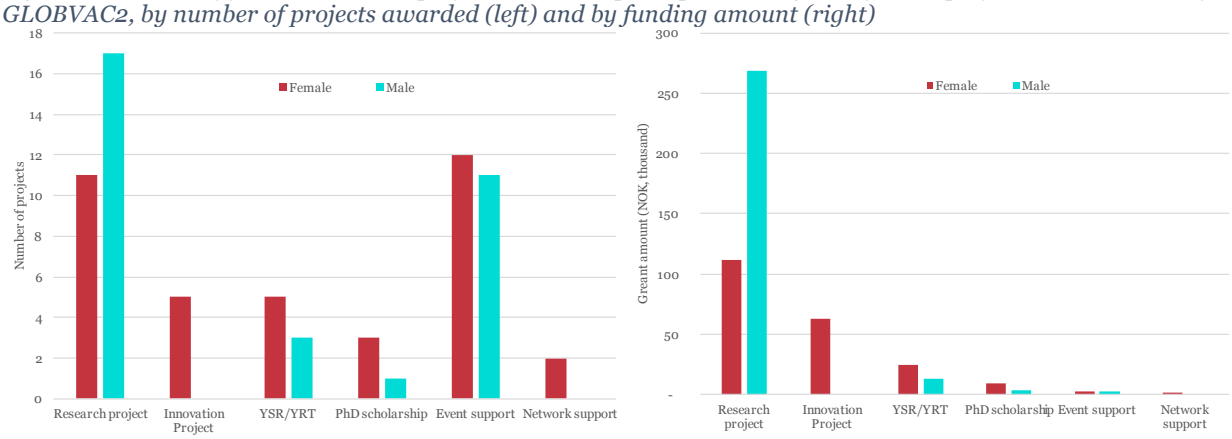
3.3.5 Impact on gender balance

In the RCN policy "Gender balance and gender perspectives in research and innovation, 2013–2017" it is stated that RCN will work more systematically to promote gender balance within the projects funded by RCN.[24] One of RCN's goals is therefore to increase the proportion of female project managers and women in key academic positions. To this end, a target was set that in new projects over 40 percent of these positions should be held by women by 2017.

Within the 70 projects in the GLOBVAC2 portfolio 38 are, or have been, led by female project leaders, accounting for approximately 54 percent of all grant beneficiaries (Figure 19). However, for research projects there is still a clear imbalance in favour of male project leaders, as only 39 percent of such projects have female project leaders. This is also reflected in the total amount of funding granted to male and female project leaders. While 43 percent of overall funding was awarded to women, only 29 percent of funding for research projects was awarded to female project leaders. Whilst these numbers are in themselves not extremely imbalanced, and may rectify themselves over time, as nowadays the majority of students in this discipline are female, they do point towards a continued need to promote the position of women in research.

[24] Gender balance and gender perspectives in research and innovation – Policy for the Research Council of Norway 2013–2017 (2014), Research Council of Norway

Figure 19 Number of female and male project leaders or principal investigators for the projects and activities of GLOBVAC2, by number of projects awarded (left) and by funding amount (right)



Over half (59 percent) of survey respondents felt that the GLOBVAC programme had significantly contributed to the participation of women in GHR. However, most interviewees had the perception that in Norway male and female researchers have equal opportunities in their research career and that it is therefore not necessary to set such explicit targets. This perception is not fully supported by EU data and data from the Nordic Institute for Studies in Innovation, Research and Education (NIFU), which shows that women are in fact still underrepresented in academic positions in Norway.[25] [26]

I think the GLOBVAC programme has done a great job and consistently given priority to women in the application process. During the programme, the global health research area has grown significantly in Norway. To me it appears indeed to be a gender mixed group. (GLOBVAC project leader)

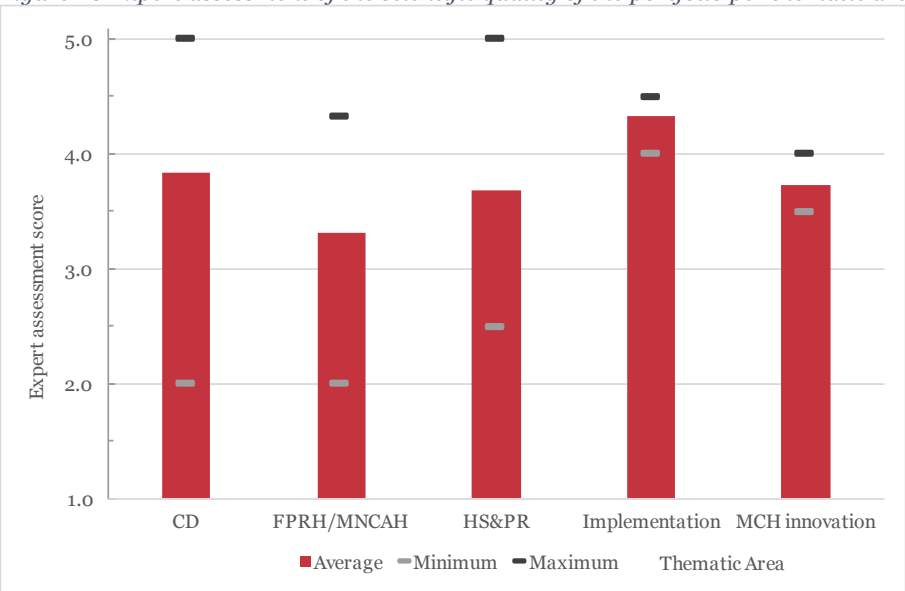
[25] She Figures 2015 – Gender in Research and Innovation, Statistics and Indicators (2015), European Commission

[26] Fortsatt få nye kvinnelige professorer (2015), NIFU

3.3.6 Quality of project portfolio

The quality of the project portfolio was judged by the Expert Panel. They rated the scientific quality of the individual projects, based on proposals and progress reports, as nationally good to internationally visible (with an average score across the entire portfolio of 3.7, on a scale of 1–5)(Figure 20). There is some variation across the thematic areas, though it should be noted that in some areas the number of projects assessed was very small.[27] Overall, ten projects scored marks signalling insufficient quality (marks less than 3), whereas 27 projects were rated as of international importance (marks of 4 and above). The potential for impact of the projects was similarly judged, with an average portfolio score of 3.3. For 11 projects the Expert Panel did not see sufficient potential for impact, whereas for 12 projects the potential for impact was considered high to very high (Figure 21).

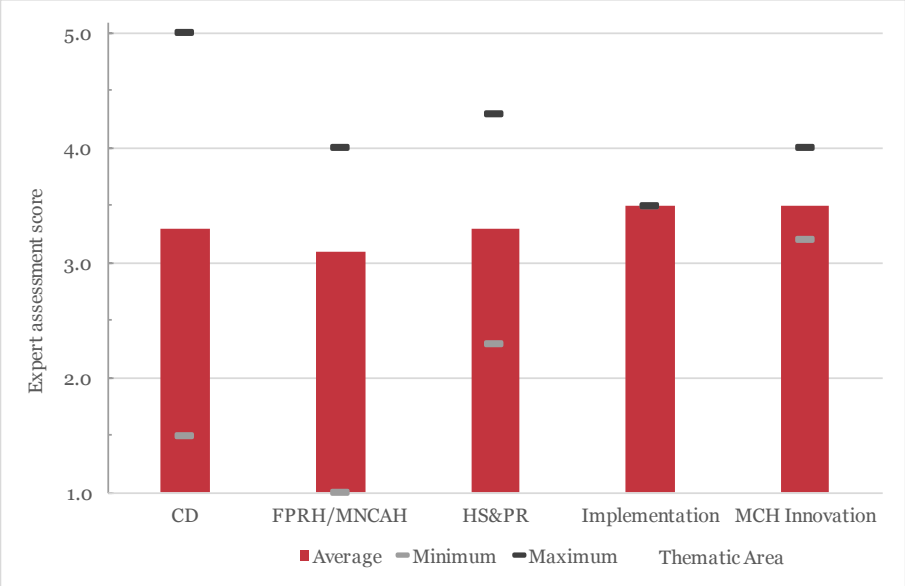
Figure 20 Expert assessment of the scientific quality of the portfolio per thematic area



Source: Technopolis Group (2016), based on data provided by the Expert Panel. (Note that minimum and maximum scores are based on the averaged scores per proposal). 1 = very poor; 2 = nationally not good; 3 = nationally good; 4 = internationally visible; 5 = internationally excellent.

[27] Absolute number of projects in the various areas as follows: CD (25), FPRH/MNCAH (13), HS&PR (14), Implementation research (3), and MCH Innovation (5)

Figure 21 Expert assessment of the (potential for) impact of the portfolio per thematic area



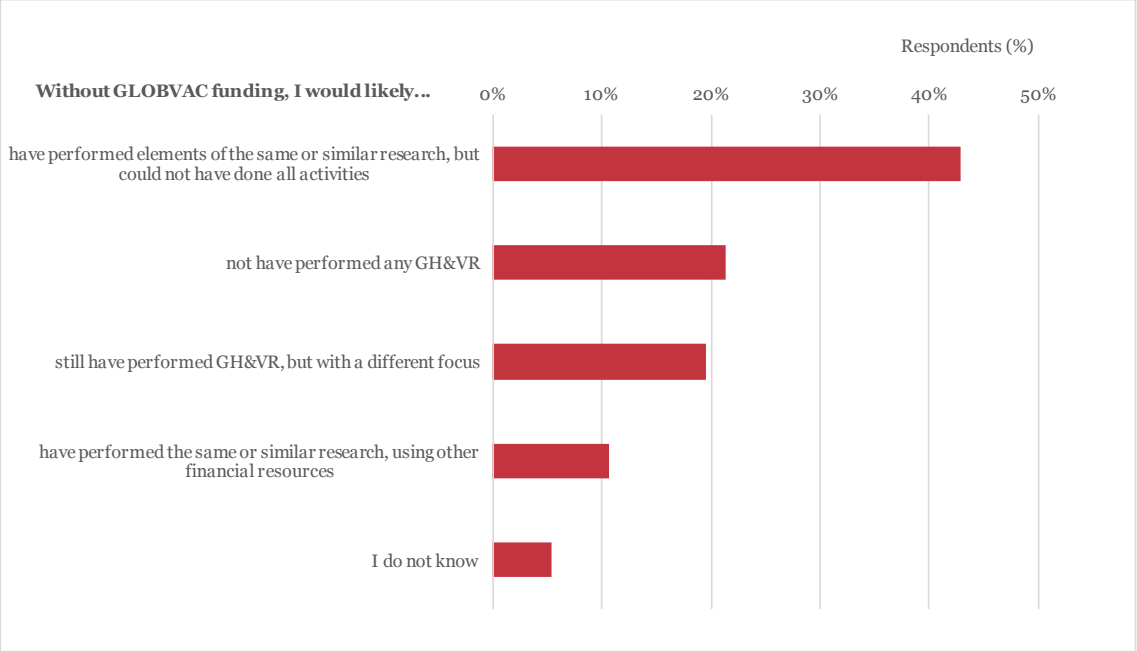
Source: Technopolis Group (2016), based on data provided by the Expert Panel. (Note that minimum and maximum scores are based on the averaged scores per proposal). 1 = very low; 2 = low; 3 = adequate; 4 = high; 5 = very high.

The methodology as described in the proposals was sound and up-to-date, and the competencies were adequate with appropriate management structures. The Panel members found it encouraging that the programme had supported many good examples of interventions and efficacy trials, with ambitions to scale up the work following successful trials. For a number of individual projects, however, experts were more critical about particular aspects that would lower their utility, or indeed significantly impede the potential for impact. In their opinion, these projects would not normally have been funded in other competitive funding processes. The problem with poor consistency seemed to span many project areas. It is acknowledged that each project application undergoes a peer review process with expert panels making written assessment of the applications. These assessments are then considered along with applications by the Programme Board which makes the final decision on funding or rejection of proposals. One reason for that may be that proposals and progress reports often focus on background to the work and literature review rather than on providing details about the methods and data analysis, making it hard to properly assess project applications. It is however noted that applicants often provide additional information during the contract negotiations phase to clarify certain questions by the RCN Secretariat and the Programme Board. Although these documents are duly filed, these were not provided to the Expert Panel as it represents a large amount of additional data.

3.3.7 Programme relevance and added value

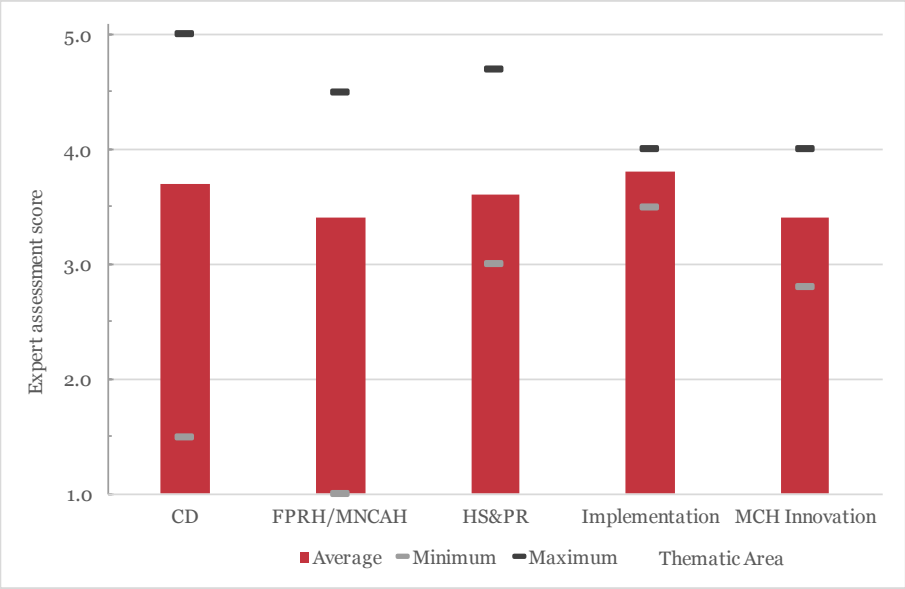
Interviews with stakeholders and responses from project leaders all indicate that the GLOBVAC programme has responded to a need within the Norwegian research community. Survey responses indicate that, in the absence of the programme, many of the project leaders would not have been able to conduct their research in this area, or at least not to the same extent (Figure 22). A significant share (21 percent) even think they would not have conducted any research at all related to global health. These results underscore that the programme clearly filled a gap in the funding landscape at the time.

Figure 22 Necessity of GLOBVAC funding from the perspective of project leaders (n=56)



Members of the Expert Panel deemed the GLOBVAC2 programme to be overall reasonably well aligned with GHR priorities and needs, with an average score of 3.6 (Figure 23). Only six projects were considered to be inadequate relevance, whereas no less than 20 projects were found to be of high or very high relevance. The assessment is fairly consistent across all thematic areas, though within the area concerning family and reproductive health there is a significant negative outlier that received a score of '1' by both experts.

Figure 23 Expert assessment of the relevance of the portfolio per thematic area



Source: Technopolis Group (2016), based on data provided by the Expert Panel. (Note that minimum and maximum scores are based on the averaged scores per proposal). 1 = very low; 2 = low; 3 = adequate; 4 = high; 5 = very high.

In terms of the programme's relevance within the broader landscape of global health research, its chosen thematic priorities are derived, in part, from key global health priorities and are aligned with, for instance, the Millennium Development Goals (MDGs). Whilst this focus is considered important, a number of stakeholders have advocated a rethink of priorities for the programme in going forward. At present, the programme is felt to be geared mainly towards curative strategies and to have a fairly biomedical focus. Several interviewees, as well as members of the Expert Panel, have suggested that the programme should pay more attention to the broader determinants of health, and health system factors that impede implementation of existing technologies and treatments, including dimensions such as healthcare financing, governance, leadership and management or human resources and health information. This discussion also ties in with the recently announced Sustainable Development Goals, which take a considerably broader approach towards health than the MDGs did. Furthermore, there is a feeling that the growing burden of non-communicable diseases in LLMICs merits attention. Particularly the double burden from communicable and non-communicable disease is considered relevant in the context of LLMICs. More generally, in terms of priority setting for the future of the programme, some interviewees have called for a more inclusive approach that takes into consideration the input from the medical and research community. It is felt that thus far the agenda largely has been driven by the MFA from a developmental and, at times, political perspective.

However, other stakeholders – in particular some members of the Programme Board – have argued that, whilst they recognise the programme's current limitations, broadening its scope would jeopardise its effectiveness by further diluting limited resources. Therefore, they advocate that, unless additional resources can be made available, the programme should maintain its current focus on biomedical research for communicable and vaccine-preventable diseases, and maternal and child health. At the same time, the board members emphasised the need to continue providing sufficient flexibility in the interpretation of the current thematic areas to maintain its ability to select projects on their scientific merit without being too restricted by narrow definitions.

One particular question that has been raised during discussions with members of the Programme Board and other stakeholders is where the most appropriate position would be for the programme along the R&D value chain. Should the programme support basic research, or should it focus on research further down the value chain where there is a greater probability of impact? This evaluation shows that the projects that can be considered most 'successful' in terms of impact achieved, in particular some of those highlighted in the case studies in section 2.3, tend to be further down the value chain where there is significantly less risk of failure. In fact, members of the Programme Board note that over time the programme focus appears to have shifted further downstream.

One can argue that the projects that are further downstream are more closely aligned with the programme's objectives, whilst for basic research there may be alternative funding opportunities, both in other RCN programmes and through, for instance, large EU programmes such as Horizon 2020. It should be noted that there are also other RCN programmes for support to medical and health services research. However, in the longer-term focusing exclusively on downstream and translational research runs the risk of empty 'pipelines' if there is insufficient funding or capacity to conduct basic research as well. A suitable balance between upstream and downstream should thus be found to ensure sufficient continuity along the entire value chain. In this respect, it is equally important to consider the added value of the GLOBVAC programme in respect to other programmes, such as the EDCTP2 programme, which provides funding for clinical trials, and Norad's support for capacity development and product development partnerships. Too much focus on downstream project support is likely to lead to overlap in this area, leaving the Norwegian capacity to conduct basic GHR potentially underdeveloped. Therefore, close coordination with all other relevant programmes and partners is necessary to ensure proper alignment and complementarity.

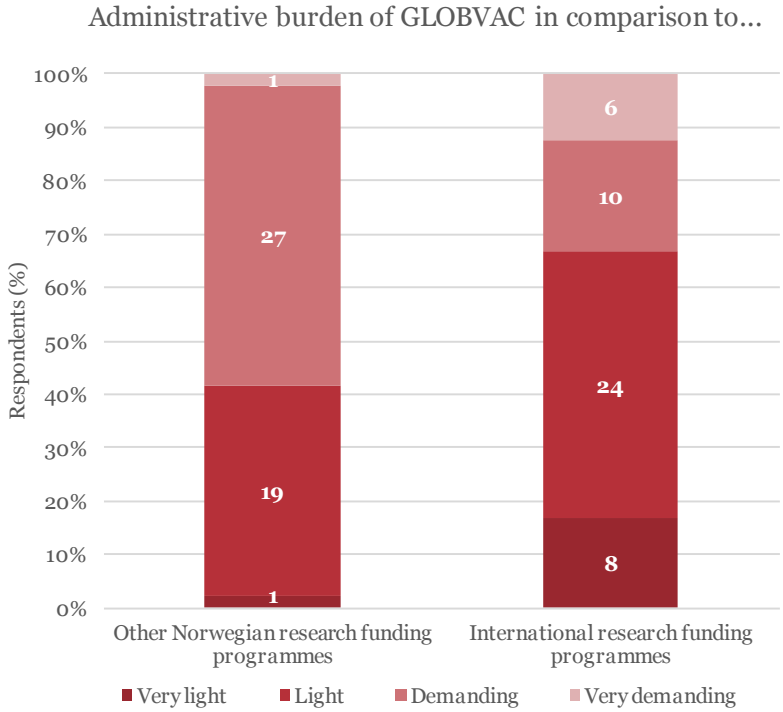
3.3.8 Programme organisation

3.3.8.1 Implementation and management processes

Researchers participating in the GLOBVAC programme are generally satisfied with the way in which the programme has been governed. Based on survey responses, we conclude that the administrative burden on beneficiaries is perceived as being somewhat heavier than for other Norwegian research funding programmes, but lighter than that of most international funding programmes (Figure 24).[28] Several respondents explicitly praised the GLOBVAC Secretariat for their helpful attitude, flexibility and speed.

In my opinion, the GLOBVAC programme has established an excellent balance of scientific rigour and administrative control. (GLOBVAC project leader)

Figure 24 Perceived relative administrative burden by GLOBVAC beneficiaries (n=48)

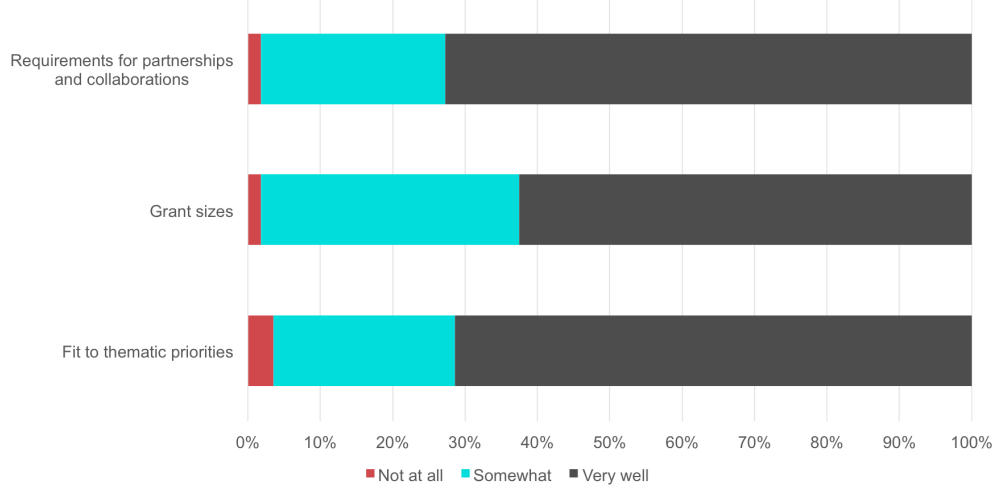


The Expert Panel who assessed the project portfolio remarked that the proposals and annual project reports often do not include sufficient detail on research approaches, use of resources or on how capacity building is implemented. However, the evaluation team is aware that there is additional documentation available for each project, including clarification correspondence by email and telephone between PIs and the GLOBVAC Programme Board/ Secretariat, often taking place outside the routine monitoring cycle, and discussions during site visits and the annual GLOBVAC conference. This approach leads to timely response to queries and concerns about specific projects. However, for purposes of accurate monitoring and transparency, annual reports would need to include any changes implemented with respect to the original proposal. This may lower the satisfaction rate of researchers with the programme management, but it would bring the system into alignment with international practice.

[28] Note that the response options did not include the option 'equal to', thus forcing respondents to either side of the comparison. This may have somewhat skewed the overall outcome. Therefore, we have also calculated an 'average' response by assigning incremental numeric values to each response category, with 1 corresponding to 'very light' and 4 corresponding to 'very demanding'. In this way, the administrative burden of GLOBVAC is scored as 2.6 in comparison to other Norwegian research funding programmes, and as 2.3 in comparison to international programmes.

From the point of view of the researchers, the design of the programme aligns reasonably well with their needs and capabilities, in terms of fit with thematic priorities, the grant sizes and the emphasis on collaboration (Figure 25).

Figure 25 Alignment of researchers' research requirements with grant specifications (n=56)

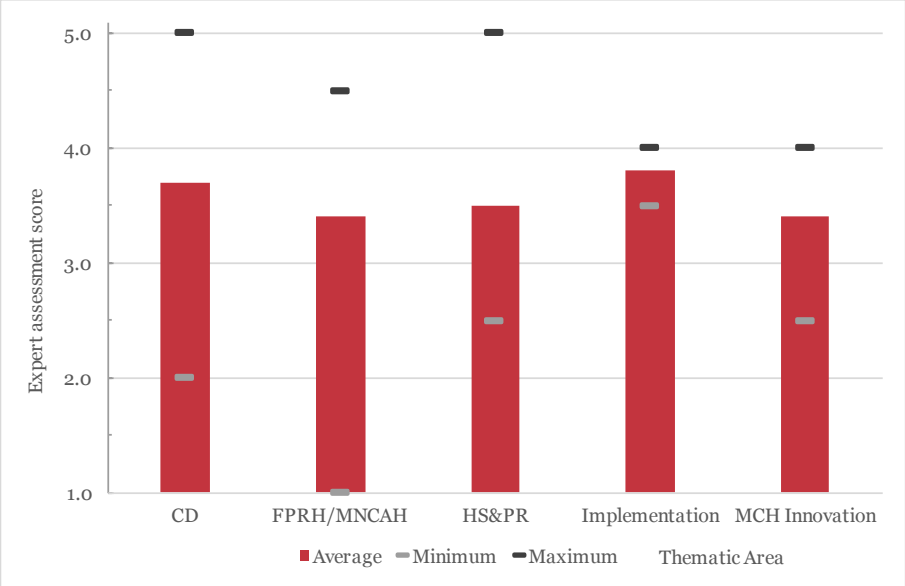


3.3.8.2 Efficiency

The Expert Panel was asked to assess whether programme funds had been allocated in such a way as to achieve the best 'value for money', ie maximising the potential for impact with the available funding. It was found that in many cases the level of detail in the documentation provided to the Panel was not sufficient to fully assess this. Many research proposals were found too short and, whilst some gave a great deal of detail on approach and methodology, others did not. In some cases, substantial sums of money had been disbursed with insufficient information in the reviewed documentation about what exactly was proposed.

Attainment of value for money first of all requires funded projects to be of high scientific quality, with appropriate planning of project activities pre-funding. However, several proposals lacked sample size calculations or provided unconvincing plans for data analysis. The Panel found this concerning, as the difference between excellent and weak science can lie in these areas. Furthermore, Panel members felt that some of the projects had rather high budgets, but recognised this could be linked to the generally higher price levels in in Norway. Although detailed budget information was a mandatory component of all proposals, in many instances Panel members could not sufficiently ascertain how the project budget was spent. This may be due to the fact that it was not considered feasible to have the Expert Panel review the full budget documentation of each project because of the limited timeframe of the evaluation. The Panel assessed the overall portfolio's value for money as adequate, with an average score of 3.0 (Figure 26). Seven projects were judged to represent inadequate value for money, of which 5 were categorised as (partially) belonging to the FPRH/MNCAH thematic area. By contrast, 20 20 projects were deemed to offer high to very high value for money.

Figure 26 Expert assessment of 'value for money' of the portfolio per thematic area



Source: Technopolis Group (2016), based on data provided by the Expert Panel. (Note that minimum and maximum scores are based on the averaged scores per proposal). 1 = very low; 2 = low; 3 = adequate; 4 = high; 5 = very high..

3.4 Perceived strengths and weaknesses of the programme

Survey respondents, interviewees and members of the Expert Panel were asked to identify particular strengths and weaknesses of the programme. Whilst many of the issues raised have been discussed to some extent in the preceding sections of this report as well, they are summarised here as they provide insight into how the programme is perceived by the researchers involved.

3.4.1 Perceived strengths

The foremost strength identified lies in the programme's unique focus on global health and vaccination research within the Norwegian research funding landscape. It is felt that for this type of research there are few other funding opportunities, whilst it is recognised as a highly important area of great importance to LLMICs. The programme's scope is generally considered appropriately clear, yet broad enough to include a good variety of subjects and disciplines. The programme has shown a degree of flexibility to respond to altered circumstances, as illustrated by the rapid response that was mounted to address the Ebola crisis.

The unique focus of the programme is also translated into its attention for capacity development, both within Norway and in the global South. Many perceive the promotion of North-South collaboration as a particularly valued contribution of GLOBVAC. More generally, the programme's attention for international and interdisciplinary collaboration between research institutions and other organisations is considered a great strength.

As already touched upon in the previous section, the GLOBVAC Secretariat is considered a supportive and effective structure for management of the programme that has shown a good understanding of the complexities and dynamics of the field. The programme has successfully implemented reasonably streamlined administrative procedures, minimising the burden on researchers as much as possible. In respect to the programme's organisational structures, it is also worth mentioning the Programme Board. Its scientific merits and international composition have been repeatedly praised and the board is considered an important guardian of the quality of the programme.

Within the GLOBVAC programme there is a variety of funding mechanisms available to researchers. This diversity is welcomed and allows both smaller and larger projects to be funded, with project leaders generally considering the funding amounts appropriate to the projects' characteristics and objectives. The programme is felt as not being unduly prescriptive, providing researchers room for flexibility and creativity as needed.

Lastly, a number of participants expressed appreciation for the knowledge-sharing and networking opportunities offered by the GLOBVAC programme, in particular through the annual GLOBVAC conference.

3.4.2 Perceived weaknesses

Strikingly, whilst many perceive GLOBVAC's chosen focus and scope as its greatest strength, it is also most frequently cited as its main shortcoming. As already discussed in section 3.3.7, some concerns have been raised about the programme's strong focus on more traditional biomedical research, and the fact that the research agenda appears to be determined by political priorities. However, in advocating a change to the current focus, opinions vary on which direction(s) should be taken. The most frequently cited concern is that over time the programme has shifted focus away from vaccination research and that recent calls have been too geared towards general global health research. By contrast, others argue in favour of greater emphasis on health-policy and systems research and research into the determinants of health.

Whilst the achievements of the programme in areas such as capacity development and network support are much valued, some have questioned the sustainability of these efforts in the absence of continued funding. Uncertainty about future funding in particular was mentioned as a barrier to the continuation or even scale-up of ongoing research projects and collaborations. These concerns have been aggravated by recent budget cuts and the cancellation of particular calls. The most recent call for

large game-changing projects also means that this funding will be allocated to a smaller number of applicants. This has led some researchers to question whether the programme has become too competitive and whether it is worth the efforts to develop a proposal.

Members of the Expert Panel felt that the quality of reporting to the Secretariat and Programme Board should be improved and that proposals should be more detailed, to provide better insight into how projects are planned and how resources will be used.

3.5 Actions taken on the 2009 mid-term review recommendations

Based on the mid-term external review of the programme conducted in 2009, several recommendations were formulated. The current evaluation considered to what extent these recommendations have been acted upon. Rather than addressing these in the order in which they were presented in the 2009 external review, we have attempted to cluster the recommendations into several main areas:

1. Overarching programme objectives;
2. Form and content of the programme in terms of its thematic priority areas and funding instruments; and
3. Processes employed by RCN to implement and manage the programme.

We have juxtaposed the recommendations in each of these areas with a summary of our observations, as described in more detail throughout the report (appropriate report sections are indicated in brackets).

2009 Recommendation	**Actions taken / needed**
1) Programme objectives	
Recruitment of new researchers and research groups within Norway with expertise relevant to global health, but whose activities may not have previously focused on relevant questions.	GLOBVAC2 has continued to attract new researchers and research groups within Norway to the programme. Within GLOBVAC2 11 percent of all project leaders had less than one year of experience in GH&V research. Additionally, significant numbers of PhD students and postdoc students worked on GLOBVAC2 funded projects. (Section 3.3.1)
Increased international collaboration with research institutes in Europe, and other developed countries.	GLOBVAC2 funded projects involved collaborations with 60 European institutions, as well as with 31 institutions in North America and Australia. Many of these collaborations involve longer-term partnerships. (Section 3.3.2)
Strengthening the capabilities of researchers in LMICs by, for instance: • *Selecting junior faculty who can be developed into the next generation of research leaders.* • *Allocation of grants that enable trainees to return to their own countries to establish themselves as independent researchers.* • *Holding workshops with outside experts in order to expand the collaborative network.* • *Establishing specific seed funds to prepare applications for international projects.*	GLOBVAC2's Young Researcher Talent grants are open to junior researchers from LMICs. Although they must be collaborating with a Norwegian Institution, they are encouraged to conduct the research in their home country. In addition, researchers from LMICs can be (co)principal investigators in projects and there is no cap on the amount of funding that can be allocated to partners in LMICs. Further capacity strengthening in LMICs remains needed, however. The calls for events are also intended to strengthen interaction between international institutions, as invitation of international

	collaborators or speakers is mandatory at funded events. (Section 3.3.3)
Ensure that the interests and expertise of Norwegian researchers correspond with the focus of activity under the EDCTP in order to compete for funding under the calls.	The Secretariat provides the alternate representative from Norway to the General Assembly of EDCTP and is working closely with EDCTP to identify opportunities for Norwegian researchers to provide added value to EDCTP2. (Section 3.3.4)
Cooperate with the Norwegian Forum for Global Health Research towards the establishment of an international research school for global health and secure funding.	The establishment of a new national graduate school for global health, coordinated by NTNU, is planned in 2016, contingent on approved proposal and funding from GLOBVAC. (Section 3.3.1)
2) Thematic priorities & instruments	
Structuring of thematic priorities around areas in which Norway has expertise.	The current thematic priorities are informed by national expertise, as well as by international priorities in global health. Based on recommendations from the 2009 evaluation and ongoing discussions within RCN and the Programme Board, the formulation of themes and calls for proposals have undergone revisions, though several priority areas have proven challenging. It is recognised that better alignment with other programmes, both nationally and at the EU level, is possible, within RCN, nationally and in the EU. (Section 3.3.7)
Allocation of seed funding for novel innovative projects and career development grants for promising Norwegian researchers in the various related fields.	An innovation funding scheme has been included in GLOBVAC2. A new scheme has been proposed, contingent upon continued funding. The Young Researcher Talent grants help support career development for young researchers. (Section 3.1)
Inclusion of implementation research as a priority in global health projects.	Implementation research has been included as a thematic priority in GLOBVAC2. (Section 3.1)
3) Programme processes	
Strengthening of the application assessment process by, for instance: • *Use of referee panels that assess all proposals in order to provide an appropriate basis of comparison with regard to scientific merit.* • *Revision of the process and timing of the calls to ensure that referees with appropriate expertise are selected and that a group of experts, particularly including scientists from abroad, be assembled.* • *Use of a two-phase process to pre-assess proposal viability.*	The GLOBVAC programme assembles referee panels with selected experts in the different thematic areas for every call. This is used for all application types except 'event support' (for which the administration provides recommendations to the Board which makes the final decision). Calls for GLOBVAC proposals are published multiple times annually targeting different activities (ie, researcher projects, support for events, innovation projects, young scientist grants). In 20122–2012 GLOBVAC employed a two-step procedure, first inviting researchers to send in an

	outline. The Programme Board provided feedback on the relevance and quality of the outlined projects. A proceeding full call was then performed. This staged process has since been abandoned again as it did not align with standard RCN procedures. However, it is expected to be established at RCN in the near future. There have also been invitations to "game changing ideas" prior to one call for proposals (2015). RCN has also shown flexibility and issued an exceptional call to allow the rapid assessment of the Ebola vaccine trial as a matter of urgency. The renewed GLOBVAC Programme Board now has 13 internationally excellent scientists. The Board decides on funding allocation, based on independent assessment of project applications by expert referee panels. Nonetheless, the Expert Panel has voiced concerns that in some cases lower quality projects appear to have been funded. In this respect, the potentially competing interests of the GLOBVAC programme in terms of scientific excellence of research projects and the need for Norwegian capacity building should be articulated.
Documentation of metrics on, for instance: • *Publications* • *Professional data (eg number of researchers and research groups, gender)* • *Number of students and institutions involved* • *Documentation of collaborative projects established, both intra- and inter-country* • *Other benchmarks, such as for education/training, policy impact, field activities, etc.* • *Timelines, with information about project modifications, deviations, and delay.*	The Secretariat has provided the evaluation team with sufficiently detailed project level data on parameters including: • List of publications, at least in part attributed to GLOBVAC • Overview of national and international researchers involved in the project • Position and gender of Principal Investigators • Overview of national and international collaboration partners • Information dissemination activities Information on project progress is documented in the regular progress reports project owners are required to submit. (Chapter 3, throughout)
Awarding of adequate, full funding, when deemed necessary, to a smaller number of the most outstanding proposals rather than cutting the budgets of all of the projects.	Research funding disbursed for projects was deemed at the right level, with a suitable balance between large "game changing projects" and smaller-scale, more exploratory projects. The large projects funded this way have already shown significant outcomes and potential for impact and this new concept serves as proof that funding complex projects at scale can achieve the desired goal of scientific excellence as well as impact in the local setting. Calls for proposals are not capped for funding at the project level, only at the level of the call in its entirety.

Overall, RCN has made commendable efforts to act upon the recommendations of the previous evaluation. Nonetheless, it is recognised that in specific areas continued or even increased efforts are needed to work towards achievement of the programme objectives. The feasibility of doing so rests, in part, on whether or not sufficient funding will be available for the remaining period of the programme.

4 Conclusions and recommendations

The summative evaluation of GLOBVAC1 and the mid-term evaluation of GLOBVAC2 together show that, to date, the GLOBVAC programme as a whole has made some significant achievements in a number of areas. Overall, it can be considered a reasonably efficient and effective research support mechanism that fills an important gap in the Norwegian funding landscape. It has been particularly successful in boosting the capacity for, and commitment to, global health and vaccination research. Since the beginning of the programme the number of research groups and institutes that are involved in the field has markedly increased. Many Norwegian research institutes have benefited themselves from international collaboration with well-known universities with long track records in global health research. In turn, through North-South collaboration they have contributed to the development of capacity in LLMIC. The programme has already achieved some remarkable scientific successes that will have important impact on the health of target populations. Independent experts have assessed the general scientific quality of the programme as generally good, though with some exceptions. The programme is much valued by the scientific community and in general stakeholders agree it forms an essential component of Norway's stated commitment to global sustainable development. Despite these achievements to date, in going forward there are several issues that need to be considered. The following sections discuss these issues in the context of the relevant considerations, and the advantages and disadvantages of specific actions.

4.1 Strengthening existing thematic priority areas

One key consideration regards the programme's current thematic priorities. Based on the outcomes of previous evaluations, the Programme Board decided to more explicitly include health systems and policy research, as well as implementation research as thematic priority areas. However, thus far these areas have proven challenging. The number of funded projects in these areas, particularly in the latter, is lagging and Programme Board members have noted that, in general, they receive fewer good quality applications in this space. Potentially, this is indicative of the type of research that is currently being conducted at Norwegian research institutes and consequently of a lack of expertise (or interest) among more senior researchers. If the GLOBVAC programme and its funders consider these areas of continued priority, it may be necessary to more actively promote research in these fields by building additional capacity among researchers at the beginning of their careers. This could, for instance, be done by funding training courses that enable students and junior researchers to gain a better understanding of the relevant research questions and develop a solid methodological base. If funded, the new graduate school for global health at NTNU could be an appropriate host for such training courses. Also the Centre for Global Health at the University of Oslo already offers some relevant programmes and could be actively engaged. Intensifying international collaboration with institutions (including private partners) abroad with a strong track record in these areas could also boost national capacity.

RCN should consider strengthening currently weaker areas of the portfolio by actively promoting bottom-up capacity development, for instance, through training of junior researchers and international collaboration with institutions with a proven track record.

4.2 Maintaining proper focus and flexibility

Clear priority-setting is an essential condition for any effective programme as it facilitates the attainment of sufficient critical mass for impact. Overly narrow priorities, on the other hand, could divorce the programme from its broader objectives. The GLOBVAC programme has strived for a balanced approach between an explicit focus on high-burden diseases or health problems relevant to LLMIC and flexibility to fund research into more cross-cutting and systems-related areas. Nonetheless, some researchers and other stakeholders have called for a shift in current priorities, allowing more space for, among others, the emerging burden of non-communicable diseases (as well as mental health and violence) in LLMIC and the broader health and sustainable development agenda. Whilst these are indeed pressing issues, with great relevance to the programme's target groups, there

is an acute risk that expansion into newer fields will jeopardise some of the programme's achievements to date. Despite commendable progress, the Norwegian capacity for global health and vaccination research still appears to be built on a relatively narrow and fragile base; expansion of the current scope without an augmentation of the overall programme finances could result in a dilution of the resources necessary to sustain this base.

Furthermore, more so than the communicable diseases currently researched in the GLOBVAC portfolio, non-communicable diseases are a problem of the developed world as well. Funding for basic research in this area is thus likely to be available through a variety of other funding programmes. Although the study of the social determinants of health is not explicitly included within the current thematic priorities, there appears to be sufficient scope within many of these priorities to allow funding of such projects. It is, however, possible that researchers are insufficiently aware of these flexibilities and are thereby discouraged from proposing projects they themselves consider to be out of scope. Therefore, rather than significantly altering or expanding the priority areas for the immediate future, the GLOBVAC Secretariat should ensure that researchers have sufficient opportunities to discuss and assess the feasibility of their applications before preparing a full proposal. Also, an open call for proposals at a limited scale could be considered to determine whether there is in fact interest and capacity to conduct such research.

For better evaluation of future proposals, RCN could also be more directive about the level of detail regarding the research methods and data analysis, and strongly encourage a greater degree of interdisciplinary working in research projects.

A more thorough reassessment of priorities should take place when the national research base has had more time to establish itself. Such an assessment could take place, for instance, in around two years time (mid-2018), and again at the end of the funding period for GLOBVAC2 (2020) if the programme will be continued. Nonetheless, throughout the programme there should be regular discussions with a broad range of (international) stakeholders, including other global health funders, networks and initiatives, about the contents of calls and the strategic direction of the programme to clarify the decision-making processes. In these discussions it is also important that the research agenda remains evidence-guided (eg based on epidemiological data on burden of disease, identification of current knowledge gaps and opportunities) and is not driven by political motives. This particularly applies to institutionalisation of a mechanism for rapid action. Whilst this action has been highly effective and has had an enormous positive impact on halting the deadly epidemic, it has also had significant consequences for the programme's ability to fund other research projects. It is thus important to recognise the potential for political misuse of such mechanisms and to ensure that measures are in place to safeguard the scientific quality and relevance of the programme.

To safeguard and build upon the impact made to date, the GLOBVAC programme should maintain a clear focus on a limited number of priority areas, but allow for flexible interpretation of thematic priorities.

RCN should ensure that priority-setting and decision-making are sufficiently transparent, based on meaningful stakeholder dialogue.

4.3 Positioning GLOBVAC along the R&D value chain

The programme's primary objective is to "support high-quality research with potential for high impact that can contribute to sustainable improvements in health and health equity for poor people in LLMICs". It is a natural consequence of this objective that a relatively large share of the resources has been put towards supporting further downstream projects with greatest potential for impact. In some cases, the programme has also strategically engaged in co-funding, contributing to projects in an advanced stage of development where significant funding from other parties had already been secured. This approach has proven successful as it has resulted in a number of high-profile achievements of immediate relevance to people in LLMIC. Nonetheless, RCN and the Programme Board should guard against an overly opportunistic approach whereby only the most promising projects are cherry picked.

Part of the strength of the programme lies in its ability to enable researchers to conduct basic research for which they are less likely to secure resources elsewhere. Late stage clinical trials and product development activities, for instance, may be funded also with support from EDCTP or in partnership with PDPs. GLOBVAC should maintain a proper balance between basic research and downstream projects. It could also help researchers with promising or successfully completed GLOBVAC projects to connect to other institutions (eg private partners or PDPs) and funders who can help to take the research findings further along the value chain. Successful projects require stronger involvement of local communities and local policy makers to achieve a greater potential for impact.

GLOBVAC should maintain an appropriate balance between upstream (basic) and downstream research projects in the portfolio. To increase valorisation of research findings, it should consider creating additional opportunities for researchers to come in contact with organisations and funders capable of supporting research further down the value chain.

4.4 Clarifying capacity development objectives

Although GLOBVAC has certainly made meaningful contributions to the development of research capacity in LLMIC, research funding programmes are by their very nature not optimally suited for sustainable and systemic capacity development as the funding is tied to specific projects with a duration of usually around 3-5 years. These projects involve only a limited number of institutions and countries. Furthermore, although GLOBVAC funding recipients have collaborated extensively with partner institutions in the South, the extent to which these collaborations translate into meaningful skills transfer is unclear. At present, GLOBVAC requires that project owners are Norwegian institutions, even though the principal investigator can be a non-Norwegian national (preferably from a LLMIC). This requirement limits the opportunities for country-driven research by LLMICs. The research agenda thus essentially remains dictated by the donor country, a situation that is generally considered less than ideal. By allowing LLMIC-based institutions to take project ownership, whilst creating 'match-making' opportunities between LLMIC- and Norway-based institutions, the GLOBVAC programme could strengthen its impact on capacity development in LLMIC, create equitable partnerships and enhance the projects' value for money. Furthermore, if the programme maintains capacity development as an explicit goal, it may want to consider whether resources for this purpose could be used more effectively if they are more concentrated in particular countries, institutions or even projects than is currently the case. Potential downside of such concentration is that some institutions that currently receive funding would fall out of scope and become ineligible. It also would reduce the programme's ability to fund projects on their scientific quality and relevance.

Discussions with stakeholders from RCN, the Programme Board and Norad indicate that the Norwegian government considers research capacity development in LLMIC a priority and that it is committed to stimulate this. To this end, Norad provides core funding to some research institutions in LLMICs and supports research capacity development through the Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHED). In this context, RCN and the Programme Board should carefully assess whether there is room for greater synergy with these efforts by linking resources and creating co-funding opportunities, though it is recognised they are already actively involved in hereto important dialogue.

RCN should consider new approaches to more sustainably strengthen research capacity development in LLMIC. Potential mechanisms include allowing LLMIC-based institutions to take project ownership, concentration of resources and collaboration with other Norad supported initiatives for capacity development.

4.5 Ensuring a sufficient funding base

The Norwegian government remains committed to improving the health of those in LLMIC and to supporting GH&VR in Norway. However, the current uncertainty about future funding in the contribution GLOBVAC receives from the MFA/Norad will likely have significant impact on the programme's ability to achieve its stated objectives for the remainder of the funding period.

Researchers have expressed clear concerns about anticipated calls and question whether enough funding will be available to support their proposals, given that most of the programme funds have already been allocated. Currently, the MFA/Norad funding is by far the most important source of income for the programme. Additional sources of funding would thus be highly desirable to secure the programme's financial stability. However, it is not clear if at present there is much possibility to extend the funding base. Potentially, additional funding could be obtained from the Ministry of Health and Care Services, though this may require somewhat of a shift in programme priorities. Furthermore, although a number of private sector partners are already involved in GLOBVAC projects, there remains scope for greater collaboration with the private sector, both nationally and internationally. RCN should also continue its efforts to co-fund projects together with other global health funders and networks to support larger, multidisciplinary and transnational projects with potential to respond to important priorities and deliver a more complete body of research within a reasonable timetable. In this regard, a more extensive effort to increase the international visibility of GLOBVAC could be beneficial.

Erosion of the funding base for GLOBVAC2 will likely have a strong negative impact on the programme's ability to achieve its stated objectives. Although the potential for additional funding sources should be explored, for example through co-funding of larger projects with other global health funders, it is recommended that expected allocations be maintained.

Acknowledgements

The assignment was carried out between September 2015 and February 2016 by a team consisting of Thyra de Jongh, Peter Varnai, Göran Melin, Marina Svetachova, Maria Grudin and Joost van Barneveld. The assignment was led by Göran Melin and quality controlled by Tomas Åström.

We would like to take this opportunity to acknowledge that the evaluation team has received tremendous support from RCN staff and assistance of representatives of several other organisations. We are particularly grateful for the time invested by survey respondents, interviewees, and members of the GLOBVAC Secretariat and Programme Board. Last, the Expert Panel is kindly acknowledged for their valuable contributions.

Appendix A Documentation available to the evaluation team

The documentation provided to the evaluation team by the GLOBVAC Secretariat included the following:

- GLOBVAC1
  - Programme plan (2006–2011)
  - Mid-term review (2009)
  - Annual reports
  - Final reports
  - Result indicators
- GLOBVAC2
  - Work programme plan (2012–2020, and revised)
  - Financial overview of income and allocations
  - Self-assessment of the GLOBVAC Board
  - Minutes of Programme Board meetings
  - Annual reports (2011, 2012, 2013 and 2014)
  - Reports from site visits to Tanzania and Ethiopia
  - Overview of ongoing projects with data on, among others, funding, contact details of project leaders, participating institutions, and publications
  - Grant proposals, and progress reports (2014, 2015) for all projects funded under GLOBVAC2
- Various other background documents

Appendix B Web survey

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The Research Council of Norway

Globvac Evaluation

Introduction

This questionnaire is part of an independent evaluation of the Global Health and Vaccination Research programme, commissioned by the Research Council of Norway. The evaluation assesses the outputs, outcomes and impacts achieved under the programme. The evaluation will be carried out by Technopolis Group / Faugert, an independent advisory organisation.

You have received an invitation to complete this questionnaire because you have received funds through the GLOBVAC programme. Your input in the evaluation will be very valuable. We would therefore be grateful if you could complete this questionnaire. The information you provide will be treated confidentially and will be presented to RCN at an aggregate level only. Your individual information will not be shared outside the independent evaluation team, and will not be used for any other purposes. The final evaluation report will be made available by RCN.

We recommend that you keep the following information at hand during completion of the questionnaire:

- An overview of researchers and other personnel who have contributed to the funded research projects;
- Budget information about the funded research projects;
- A list of outputs, including publications, generated from the funded research projects.

We anticipate the questionnaire will take no more than 30 minutes to complete. You can store your answers by pressing save, and later on re-enter the questionnaire to complete missing information. However, once you have submitted the completed questionnaire, it will no longer be possible to review or edit information.

We kindly ask that you submit the completed questionnaire before November 20. Should information to answer a question remain unavailable, please leave the question unanswered and proceed with the survey without filling in that particular answer.

If you have any questions regarding this questionnaire, please contact Technopolis Group: joost.vanbarneveld@technopolis-group.com.

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Globvac Evaluation

Background

Throughout this questionnaire 'the programme' refers to the Global Health and Vaccination Research (GLOBVAC) programme.

* 1. Please indicate: In what GLOBVAC programmes did you participate ?

- ◯ GLOBVAC 1 (2006-2011)
- ◯ GLOBVAC 2 (2012 - 2020)
- ◯ GLOBVAC 1 and 2

2. Prior to receiving the first funds from the programme, how long had you been conducting research in the area of global health & vaccines?

- ◯ Not at all
- ◯ Less than 1 year
- ◯ 1-5 years
- ◯ 5-10 years
- ◯ 10 years or more

3. Please rank to what extent your decision to conduct research in the area of global health & vaccines has been influenced by the following. The topmost position is most important (i.e. with 1 representing the most important, and 4 the least important factor)

⋮⋮ ▲▼	Professional interest and expertise in the field
⋮⋮ ▲▼	Availability of funding in the field
⋮⋮ ▲▼	(Lack of) availability of funding in other research fields
⋮⋮ ▲▼	Existing collaborations with other researchers in the field

4. Any other motivation? Indicate ranking with "precedes (#in ranking above)"

5. What reasons did you have to apply for funding from the GLOBVAC programme? (Select all those applicable)

- [ ] To continue or expand pre-existing projects on global health & vaccines research
- [ ] To initiate new global health & vaccines research projects
- [ ] To strengthen existing, or initiate new research collaborations
- [ ] Other (please specify)

Human resources

The following questions focus on all researchers and other staff who have been working on research projects fully or partially funded by the programme.

6. How many PhD students who have been working on projects fully or partially funded by the programme have thus far graduated? *(If you conducted multiple projects under the programme, please provide cumulative numbers over all relevant projects.)*

Fully programme funded (#PhD students)

Partially programme funded (#PhD students)

7. How many PhD students who have been working on projects fully or partially funded by the programme are expected to still be promoted *between now and two years after the end of the funding period*?

Fully programme funded (#PhD students)

Partially programme funded (#PhD students)

8. In the period during which you have received funding from the GLOBVAC programme, has anything changed in your own employment position?

- ◯ Yes, I have received a permanent position (tenure) at my institute
- ◯ Yes, I have received a promotion at my institute
- ◯ Yes, I have accepted a position at a different institute
- ◯ No
- ◯ Other, please specify

9. Please elaborate on the answer that you gave to the question directly above.

Human resources

10. To what extent do you feel that your work on the projects (co-)funded by the programme has directly contributed to this change in your employment position?

- ◯ Not at all
- ◯ Slightly
- ◯ Moderately
- ◯ Strongly

11. Please elaborate on the answer that you gave to the question directly above.

Human resources

12. After completion of all your projects that were or are (co-)funded by the GLOBVAC programme, do you expect to continue working in the area of global health & vaccination research?

- ◯ No, unlikely
- ◯ Maybe
- ◯ Likely
- ◯ Yes, certainly

13. Please elaborate on the answer that you gave to the question directly above.

14. One of the goals of the GLOBVAC programme was to promote greater participation of women in science. Based on your own experiences and observations, to what extent has the GLOBVAC programme successfully achieved this goal?

- ◯ Not at all
- ◯ Slightly
- ◯ Significantly

15. Please elaborate on the answer that you gave to the question directly above.

(International) Collaborations

16. In general, for your research activities in the field of global health & vaccination research (not limited to projects funded under GLOBVAC) have you collaborated with other research groups or institutes?

- ◯ Yes (this includes a single collaboration)
- ◯ No

17. What were your main reasons (not) to collaborate with other research groups?

(International) collaboration

18. Were these partners based in Norway or abroad?

- ◯ All were based in Norway
- ◯ One or more were based in Norway; one or more were based abroad
- ◯ All were based abroad

19. What type of organisations were these partners? Select all that are applicable.

- ☐ University
- ☐ Other publicly funded research institute
- ☐ Private sector institute or company
- ☐ Other (please specify)

20. How many of these collaborations were formed as a direct result of the programme?

- ◯ All (includes a single collaboration)
- ◯ Most
- ◯ Some
- ◯ None

21. Overall, how did the programme change the nature of these collaborations on the following dimensions?

	Significantly decreased	Decreased	Neutral	Increased	Significantly increased
Intensity	◯	◯	◯	◯	◯
Interdisciplinarity	◯	◯	◯	◯	◯
Productivity	◯	◯	◯	◯	◯
Relevance	◯	◯	◯	◯	◯

Programme outputs and knowledge dissemination

22. Of all peer-reviewed publications generated thus far as a direct result of your projects (co-)funded by the programme, how many were published under Open Access (OA) conditions?

- ○ Over 75% (includes "all")
- ○ Between 50% and 75%
- ○ Between 25% and 50%
- ○ Less than 25% (includes none)
- ○ Not applicable, as there are no peer-reviewed publications (yet)

23. Please specify why you did (not) opt for OA, and if you received any additional funding for the OA publication costs.

24. If you have been granted any patents, or have generated other forms of intellectual property as a direct result of the projects that were (co-)funded by the programme, what strategies do you apply to safeguard access to this for people in low- and middle-income countries? Select all that are applicable:

- ☐ Licensing agreements include clauses to ensure access and equitable pricing
- ☐ Deposition in patent pools (e.g. WIPO Re:search, Medicines Patent Pool)
- ☐ Not applicable, as no such IP was generated (yet)
- ☐ None
- ☐ Other (please specify)

25. Please elaborate on the answer that you gave to the question directly above.

26. To what extent have you used any of the following methods for disseminating your GLOBVAC funded research to the *scientific community*, besides journal publications?

	Never	Occasionally	Often
Conference or meeting presentations	○	○	○
Interviews or editorials for scientific journals	○	○	○
Articles on university, group or personal websites	○	○	○
Social media (e.g. Twitter, LinkedIn, Facebook)	○	○	○
Other (please specify below)	○	○	○

Other (please specify)

27. To what extent have you used any of the following methods for disseminating your GLOBVAC funded research to the *general public*?

	Never	Occasionally	Often
Articles/interviews in popular science magazines	○	○	○
Articles/interviews in newspapers or regular publications with a non-scientific focus	○	○	○
Appearances on radio/television	○	○	○
Participation in weblogs, online discussion fora, or on social media channels	○	○	○
Other (please specify below)	○	○	○
None of the above	○	○	○

Other (please specify)

28. Please provide examples or, if possible, links to these sources.

Relevance & added value of the GLOBVAC programme

29. In your opinion, how does the GLOBVAC programme align with your research funding needs in each of the following dimensions.

	Not at all	Somewhat	Very well
Fit to thematic priorities of the programme	○	○	○
Grant sizes	○	○	○
Requirements for partnerships and collaborations	○	○	○

30. Please elaborate on the answer that you gave to the question directly above.

31. Please select which of the following statements best represents your situation.

If the funding from GLOBVAC had not been available…

- ○ I would likely have performed the same or similar research, using other financial resources
- ○ I would likely have performed elements of the same or similar research, but could not have done all activities
- ○ I would likely still have performed global health & vaccination research, but with a different focus
- ○ I would likely not have performed any global health & vaccination research
- ○ I do not know

32. Please elaborate on the answer that you gave to the question directly above.

33. How would you assess the administrative requirements of applying for, and participating in the GLOBVAC programme (e.g. reporting, deliverables, administration), in comparison to:

	Very demanding	Demanding	Light	Very light
Other Norwegian research funding programmes	○	○	○	○
International research funding programmes (e.g. FP7/H2020/EDCTP)	○	○	○	○

34. Please elaborate on the answer that you gave to the question directly above.

End of questionnaire

On behalf of Technopolis Group and RCN, many thanks for your cooperation.

35. What do you think is a particular strength of the GLOBVAC programme?

36. What do you think is a weakness of the GLOBVAC programme that should be addressed in the future?

37. If you have any further questions or comments, please use the text box below. We will aim to respond to your questions as soon as possible.

Appendix C Interview topic guide

Topic guide

Interviewee	
Position/role	
Date	
Interviewer	

Please note that the objectives and thematic areas of GLOBVAC are listed at the end of the document.

Background
1. Please briefly describe your role/history with the GLOBVAC programme.
2. In your opinion, why was there a need of a programme such as GLOBVAC? *- Why was there a need for a dedicated funding programme to support global health and vaccination research in Norway? (eg rather than funding only through international programmes, eg Horizon 2020, EDCTP[29])* *- Was funding for this type of research not sufficiently covered by existing funding schemes for health-related research? If not, why might this have been the case (eg lack of priority?)*
3. In what other ways does the Norwegian government invest in this type of research, both at the national and the international level? *- Does it, for instance, provide support for the Product Development Partnerships (eg Malaria Medicines Venture, International AIDS Vaccine Initiative, Global Vaccine Alliance (GAVI)? If yes, how effective is it compared to GLOBVAC?* *- What role does the Norwegian government see for the private sector in global health research?*
4. What is the long(er)-term vision for Global Health Research in Norway? *- Is there a target for how many groups or institutes should be active in the field?*
5. How were the priorities and thematic areas for GLOBVAC selected? *- Was there a needs assessment done?* *- Who were involved in the decision-making?* *- How is funding allocated across the thematic areas and calls?* *- How do the programme priorities align with the national priorities and strategies for global health & development?*

Relevance
6. What are the most pressing global health research needs and knowledge gaps? *- Do the objectives of the programme meet those needs and knowledge gaps?* *- If not, please identify in what areas you see a misalignment and why.*
7. Are the objectives of the programme aligned with, or complementary to, global health research priorities of other national and international bodies (eg Norwegian Forum for Global Health, NORAD/NORHED, WHO, EU/EDCTP, UN Sustainable Development Goals)?

[29] GLOBVAC funds do also support EDCTP calls

Effectiveness
8. To what extent has the programme contributed to new GHR *activities* and scientific *outputs* in the thematic priority areas? Please provide examples.
9. In your opinion, what are the main *results* of the GLOBVAC funded project to date?
10. What would you consider to be/have been the main implementation challenges for GLOBVAC funded projects? • *How do you think these should be addressed?*
11. Overall, to what extent do you feel the programme has reached its overarching goals, or is on its way to doing so? Specifically, in which way, if any, has the programme resulted in: • *Development of a high-quality GHR infrastructure in Norway?* • *Development and support of national and international GHR collaboration and partnerships?* • *Capacity development for GHR in low- and lower-middle income countries (LLMIC)?* • *Increasing (policy) awareness about the needs for GHR?* Please describe successes and challenges.

Efficiency
12. How have the different funding instruments available under GLOBVAC contributed to the overall aim and the thematic priorities of the programme? - Would you recommend any change in the funding instruments (in order to reach the goals faster or improve the programme)?
13. Do you think that the GLOBVAC funding is being used and allocated in a way that provides the best value for money? - If not, why not and how could this be improved?

Utility / impact
14. In what way has the programme contributed (or will potentially contribute) to its ultimate objective of improvements in health and health equity for target populations? If possible, please provide specific examples. - What do you see as the main barriers to achieving / maximising this impact?

Durability
15. Of the results and impacts achieved by the programme so far, what is likely to be sustainable without further programme support?
16. How could the results achieved be sustained after the programme period?
17. Do you consider it necessary for RCN to continue with a dedicated funding programme of global health & vaccination research beyond the current funding period?

Concluding remarks
Is there something else you would like to add regarding GLOBVAC or the evaluation of GLOBVAC?

Appendix D Report of the Expert Panel on the GLOBVAC2 project portfolio

D.1 Introduction

As part of the mid-term evaluation of the second phase of the Programme for Global Health and Vaccination Research, (GLOBVAC2, 2012-2020), commissioned by the Research Council of Norway and conducted by the Technopolis Group, an international expert referee panel was appointed by the Research Council in October 2015. The objective of the expert panel was to assess the extent to which the current portfolio is relevant and effective to deliver the objectives of GLOBVAC2, based on a review of constituent projects (2012-2015). This formative assessment will be used to provide a baseline for current research activities and contribute to recommendations to maximize the impact of the GLOBVAC programme in the period 2016-2020.

The overall aim of GLOBVAC is to *support high-quality research with potential for high impact that can contribute to sustainable improvements in health and health equity for poor people in low and lower-middle income countries.*

The specific objectives of GLOBVAC2[30] were defined as follows:

- Develop and support internationally competitive and sustainable public and private research groups and institutions in Norway;
- Develop and support national and international research collaboration and partnerships;
- Secure capacity building through developing and supporting partnerships with research groups and institutions in low- and lower-middle income countries;
- Inform and increase awareness among policy makers, researchers and the public about needs for and results from global health research.

The programme is considered to have a wide scope but intends to provide research funding in the following thematic priority areas:

1. Prevention and treatment of, and diagnostics for, communicable diseases, particularly vaccine and vaccination research;
2. Family planning, reproductive, maternal, newborn, child and adolescent health;
3. Health systems and health policy research;
4. Innovation in technology and methods development;
5. Implementation research.

The following sections of the expert review provide details of the Expert Referee Panel, its activities and procedures (Section D.2); the findings of the Panel are described in Section 3; the strength, weaknesses and future opportunities of the programme are summarised in Section 4; and finally a list of recommendations are provided in Section 5.

This evaluation report was drafted by the evaluation team following the full review of the GLOBVAC2 projects by the Expert Panel and presents the final findings of the Panel. It is stressed these opinions and recommendations are not necessarily aligned with those of the evaluation team.

[30] Revised Work Programme GLOBVAC2 2012-2020, The Research Council of Norway, January 2014

D.2 Panel composition, activities and procedures

D.2.1 Composition of the Expert Panel

The composition of the Expert Panel was determined by RCN based on high-level expertise in the required thematic priority areas of the programme, both in the medical and social science disciplines. The five internationally recognised scientists were appointed by RCN (Division Board for Society and Health), after careful examination of their academic expertise and the receipt of their signed expert declarations that included a statement on impartiality and confidentiality. The work of the Expert Panel was designed and facilitated by the evaluation team of Technopolis. The Expert Panel consisted of:

- **Stig Wall**, Emeritus Professor of Epidemiology & Global Health, Umeå University, Sweden
- **Michael C. English**, Professor of International Child Health, University of Oxford, UK and Head of Health Services Unit, KEMRI-Wellcome Trust Research Programme, Kenya
- **Bernard Van der Zeijst**, Professor of Vaccines and Vaccination, University of Leiden, The Netherlands
- **Alimuddin Zumla**, Professor of Infectious Diseases and International Health, University College London and Consultant Infectious Diseases Physician, University College London Hospitals NHS Foundation Trust
- **Rachel Jewkes**, Honorary Professor, School of Public Health, University of the Witwatersrand, Johannesburg and Director of Health Unit of the Medical Research Council, South Africa

D.2.2 Documentation provided to the Expert Panel

Technopolis has provided the following documents to the members of the Expert Panel:

- Revised Work Programme GLOBVAC2 2012-2020
- The RCN presentation of programmes and activities
- GLOBVAC Annual Reports (2011-2014)
- Calls for Proposals (2011-2015)
- Grant proposals, applications and project descriptions
- Project progress reports, 2015

Based on this information, the Expert Panel was able to judge aspects of the research projects presented. However, it is stressed that the purpose of the expert review was not to conduct a comprehensive peer review of individual projects, but rather to obtain an evidence-based assessment of the thematic composition of the GLOBVAC2 programme portfolio as a whole.

D.2.3 Procedures followed by the Panel

Technopolis provided the Expert Panel an introduction to the assignment and access to all documentation described above. Together with RCN a preliminary list was developed by which each project was allocated to at least two individual experts, based on their area of expertise. This list was subsequently amended following confirmation or request to modification by members of the Panel. All project types were reviewed by the Panel, with the exception of event support projects, giving a total of 51 projects for the expert assessment.

All experts reviewed their respective set of projects independently, by completing a standard evaluation workbook prepared by Technopolis. Each project was evaluated along six dimensions:

1. Scientific quality
2. Impact
3. Relevance

4. Capacity building
5. Implementation
6. Value for money.

The experts, having reviewed the available material for each project, allocated a numerical score for each of the dimensions using a 1-5 scale and supplementing this with a short explanatory comment. This scale could be interpreted as follows:

Score	Description	Definition
5	Internationally excellent (very high)	The output of the programme is comparable with the best work internationally in the same area of research. The research possesses the requisite characteristics to meet the highest international standards. Work at this level should be a key international reference point in the respective area.
4	Internationally visible (high)	The output of the programme meets a high standard in terms of originality and importance. Work at this level can arouse serious interest in the international academic community, and international publishers or journals with the most rigorous standards of publication (irrespective of the place or language of publication) could publish work of this level.
3	Nationally good (adequate)	The output of the programme is considered good at the national level. Nationally recognised publishers or journals are likely to publish work of this level. There is some potential for publication by international publishers or journals as well.
2	Nationally not good (low)	The output of the programme contains new scientific discoveries only sporadically and falls short of national standards. Researchers are not involved in international debates of the scientific community. Work of this level is unlikely to be published in recognised journals.
1	Very poor (very low)	The output of the programme is considered very poor by any scientific standards. Work of this level is unlikely to be published.

In cases where the above descriptions did not fit the dimension, the numerical values should be interpreted as: 5 = very high; 4 = high, 3 = adequate, 2 = low, and 1 = very low.

D.2.4 Limitations

Experts signalled at an early stage that the structure of the project proposals and annual progress reports and information available within made it difficult to scrutinise all required dimensions of the evaluation in detail. In particular, they noted that

- Research proposals were rather short and there was no clear specification of the level of detail required. This is an issue to principal investigators, peer-reviewers and ultimately independent evaluators.
- Resource utilisation was hard to ascertain without suitable detail about budget information in the reports and the diverse costing between countries.
- Experts were not fully familiar with current costs of research in all countries relevant to research projects. In these cases, experts relied on comparisons between projects and level of costs between Norway and other countries.

- Experts were required to provide a numerical score along the various dimensions based on information available to them in the proposal or progress report. If an expert was not able to provide a score, no numerical value was entered in the scoring table.
- Each project started at different time points and was at a different stage of progress at the time of evaluation. Experts assessed the projects accordingly and considered both results already achieved as well as expected results and potential for impact based on the description of the scientific project in the proposal.
- No one expert has scrutinised the entire GLOBVAC2 portfolio; however, each and every GLOBVAC2 project has been reviewed by at least two experts independently and as such the resulting expert opinion should provide robust judgements for the current evaluation.

D.3 Findings of the Expert Panel

The findings of the Expert Panel are structured against the specific objectives of the programme and the evaluation criteria of the project portfolio assessment.

D.3.1 Overall performance of the GLOBVAC2 programme

Overall the GLOBVAC2 programme, based on a review of its constituent projects, was found to be well aligned to global health research priorities and needs. The scientific quality of the individual project applications was generally high. The methodology as described in the proposals was sound and up-to-date, the competencies were adequate with appropriate management structures. However, for a number of individual projects, experts were more critical about project aspects they felt would lower their utility or indeed significantly impede the potential impact. In some cases, it was suggested that project proposals should have been rejected based on the poor scientific quality evident in the proposal, or that –once funded– these projects should have been significantly improved by more thorough project oversight processes. It was brought to the attention of the Expert Panel that additional documentation is available for each project, including clarification correspondence by email and telephone between PIs and the GLOBVAC Programme Board/ Secretariat, often taking place outside the routine monitoring cycle, and discussions during site visits and the annual GLOBVAC conference, but it was not feasible to review this as well within the allocated timeframe. Nonetheless, for accurate project monitoring and programme evaluations, it would be important that, in future, annual reports document any changes implemented with respect to the original proposal.

The Expert Panel found it encouraging that purely descriptive research was not supported by the programme. Instead there were many good examples of interventions and efficacy trials with ambitions to scale up the work following successful trials. There was a good selection of projects on maternal, newborn and reproductive health and the projects were reasonably diverse. Some often more neglected areas of research, such as mental health, domestic and sexual violence, diarrhoeal diseases and meningitis, were also addressed, but far from proportionately represented (according to their burden) among the successful applications.

Nevertheless, the Expert Panel found that there were distinct areas that were not addressed properly with existing projects, despite the fact that most were mentioned among the GLOBVAC priority areas. For example, implementation research or health systems research with a clear theoretical basis was felt to be largely missing, at least in the global health context.[31] The role of wider health systems in low- and middle-income countries, including healthcare financing, governance, leadership and management or human resources and health information, was not commonly discussed among the proposals, although there is a strong need to tackle those issues.

[31] In the Norwegian national context health systems and implementation research is supported by, among others, the Programme on Health, Care and Welfare Services Research (HELSEVEL).

Other areas with relatively little or no coverage include diagnostics and analytic epidemiology, addressing risk factors and aetiology behind the emerging epidemic of non-communicable diseases as part of the demographic and health transition in LMICs. Although the GLOBVAC programme explicitly focuses on infectious diseases, communicable and non-communicable diseases are no longer mutually exclusive entities in global disease patterning, nor in their requisite health system's response. This double burden and polarized pattern may be illustrated by HIV/stroke often co-occurring.

Finally, experts emphasised that global health research requires a genuinely inter-disciplinary approach. Although in the Work Programme of GLOBVAC2 this point is explicitly acknowledged, the actual calls for proposal are not stressing this suitably so that the resulting research projects and teams are covering multiple disciplines. It was encouraging to see increasingly in proposals the use of mixed-methods approach, eg quantitative and qualitative, but many studies would further benefit from more interaction between medical and social sciences.

In terms of specific objectives of the GLOBVAC programme the following overview can be provided:

1. Develop and support internationally competitive and sustainable public and private research groups and institutions in Norway

Over half of the research projects demonstrate the required level to conduct internationally competitive research and the corresponding progress is remarkable. Most of these projects are conducted by research groups in established organisations and some by small specialist companies. Nevertheless, experts noted that up to a fifth of the projects are below the level that would be described as 'nationally good' based on the project descriptions and progress to date, and pose the question whether funding should have been focussed on areas with truly high quality research. It is acknowledged that Norway is a small country in terms of its population and not all research areas can be equally covered.

2. *Develop and support national and international research collaboration and partnerships*

Many proposals imply networking where Norwegian and reputable international collaborators and institutes are involved. The *national* elements of the research projects appear well established and are apparent. However, whilst some European, US, Asian and African involvement is present in most of the funded projects, the *international* element remains limited. In particular, for the African and Asian countries the element of *partnership* with Norwegian institutions was not striking.

3. Secure capacity building through developing and supporting partnerships with research groups and institutions in LLMIC

In many projects, there was minimal engagement of researchers from LLMIC, which misses an important opportunity especially since the work is related to specific diseases in such high endemic countries. In addition, from a purely funding perspective, more involvement of PhD students and postdocs from LLMICs would require only a marginal increase of the project budget compared with each additional Norwegian researcher. Norwegian researchers could however spend more extended time in LLMICs as part of the project thereby translating knowledge to local researchers as well as learn better the local context and implementation issues.

4. *Inform and increase awareness among policy makers, researchers and the public about the needs for, and results from, global health research*

The policy component is present in some project applications, often building on established collaborations with policy makers at government or NGO levels. However, this objective appeared to be the most difficult to achieve as many projects hardly mentioned this crucial component in either the proposal or progress report. A clear exception is the Ebola vaccine safety and efficacy trial that has shown that high quality science with global impact attracts the attention of policy makers at the highest levels.

D.3.2 Evaluation of the GLOBVAC2 programme project portfolio

Experts assessed 51 research projects of the GLOBVAC2 programme portfolio; 7 of those have only recently started and hence only project proposals were available for experts as a basis for assessment of the various evaluation dimensions. Projects were classified according to the five GLOBVAC thematic priority areas (Section D.1); 43 projects had one main priority area, while 8 projects were assigned to two categories and as such the results of these projects contribute to multiple categories.

Table 4 provides an overview of the average evaluation scores in each of the thematic priority areas along the six dimensions the projects were assessed.

Table 4 Average scores of GLOBVAC2 projects per thematic priority areas

Thematic area	Scientific quality	Impact	Relevance	Capacity building	Implementation	Value for Money
CD (n=25)	3.8	3.3	3.7	3.4	4.1	3.7
FPRH/MNCAH (n=13)	3.3	3.1	3.4	3.2	3.6	3.4
Health systems & policy research (n=14)	3.7	3.3	3.6	3.3	4.0	3.5
Implementation research (n=3)	4.3	3.5	3.8	3.8	4.3	3.8
MCH innovation (n=4)	3.7	3.5	3.4	2.8	3.8	3.4

*CDs = Prevention and treatment of, and diagnostics for, communicable diseases; FPRH/MNCAH = Family planning, reproductive, maternal, new-born, child and adolescent health; MCH innovation = Innovation in technology and methods development for maternal and child health

Quality of projects, impact and relevance

The scientific quality of projects overall is between "Internationally visible" and "Nationally good" with the highest average score seen in Implementation research, although with only 3 projects in this category. In each of the three thematic areas with the highest number of projects, there is significant variability between projects: some projects were deemed to be of the highest international standard ("Internationally excellent"), others had quality score falling below "Nationally good". The problem with poor consistency seemed to span many project areas. This shows that GLOBVAC projects include real global game-changers as well as a few that in many competitive processes would not normally be funded. The GLOBVAC2 programme may therefore want to work further on consistency of its peer review processes.

Although it was too early to conduct an impact assessment of projects as most are still ongoing, experts could already comment whether the projects had the *potential* to impact the broader global health science. The average scores show that projects exhibit a High to Medium expected impact, but with substantial variations in each of the thematic areas. Low impact scores were the result of researchers overlooking important contextual aspects or not describing the scientific approach in adequate detail.

Most projects across the thematic priority areas were deemed to have High to Medium relevance to global health research priorities, with notable exceptions that were either of exceptionally high relevance (mostly correlated with projects with the highest potential for impact) or a few with low scores, in particular in the Communicable diseases and Family planning thematic areas.

Experts consistently highlighted the following projects as having the highest quality, relevance and expected impact:

Prevention and treatment of, and diagnostics for, communicable diseases

- Towards a functional Cure for HIV: Combining reservoir purging agent (HDACi) with therapeutic vaccination (Vacc-4x)- The REDUC Study
- Evaluation of Ebola vaccine safety and efficacy in a Prefecture of Guinea.

- Phase II Trial to Evaluate Prevention of Infection with Mycobacterium tuberculosis of H56:IC31, a novel TB vaccine, in Tanzanian Adolescents
- An effectiveness trial to evaluate protection of pregnant women by a HEV vaccine in Bangladesh and risk factors for severe HEV infection.

Family planning, reproductive, maternal, new-born, child and adolescent health

- Avoiding Contraceptive Controversy. Ensuring task Shifting through Standardization of Contraceptive Implant removals.
- Zinc as an adjunct for the treatment of very severe disease in infants younger than 2 months
- The effectiveness of a girl empowerment programme on early childbearing, marriage and school dropout in rural Zambia: A cluster trial

Health systems & policy research

- Strengthening International Collaboration for Capitalizing on Cost-Effective and Life-Saving Commodities (i4C)

Innovation in technology and methods development for maternal and child health

- Avoiding Contraceptive Controversy. Ensuring task Shifting through Standardization of Contraceptive Implant removals.

Capacity building

Capacity development and training aspects, in accordance with GLOBVAC's priorities, is present in most proposals, although the degree to which this is of researchers in the focus LMICs is mixed. A small number of countries appears to be the main beneficiary and there exists a unique opportunity for Norway to have more visibility by networking West, Central, East and Southern African countries. It is critical that all research projects have a strong capacity building aspect including LMICs and that it goes beyond maintaining existing collaborations. The opportunity to impart knowledge and skills to collaborators so that new local capacity is developed for solving local health problems must be taken. However, it is acknowledged that existing LMIC collaborations are likely to yield greater impact initially as trust and shared experiences influence local ownership of research.

The capacity building component in the applications is mostly taken seriously and backed with excellent supervision from the Northern partners. In some cases however there was a clear lack of capacity building in LMICs or was not clear from the proposals and progress reports exactly how the capacity building targeting the LMIC partner group was being delivered. Experts suggest that there should be capacity building at a higher level aimed at faculty positions in LMIC countries. Building sustainable capacity relies on structural instruments, which are no doubt most successful when organised in close partnership with local organisations and ministries. Expanding the human resource pool needs to also include leaders and managers in LMICs who have the analytic capacity to use data and promote monitoring and accountability in order to inform future decision making.

It was also noted that very limited Scandinavian collaboration seems to be taking place. This may be a missed opportunity since development assistance and medical research infrastructures are rather similar in Scandinavia. For example, plans for establishing a Forum for Global Health Research seem to exist both in Norway and Sweden, apparently independently. Similarly, a Research School for Global Health exists in Sweden for 10 years and a new one is now planned for Norway.

Project management and value for money

To assess value for money, sufficient detail is required on both requested budgets and corresponding scientific activities. Although providing detailed budget is mandatory according to calls for proposal, experts could not ascertain how the project budget is spent in many instances based on proposals and progress reports. In addition, research proposals were found to be too short; some of the proposals give a great deal of detail on approach and methodology whereas others do not. This may be due to the

fact that it was not considered feasible to have the Expert Panel review the full budget documentation of each project because of the limited timeframe of the evaluation. It was also noted that additional documentation is available for each project, including clarification correspondence by email and telephone between PIs and the GLOBVAC Programme Board/ Secretariat, not part of the original proposals and annual reports.

It is clear that value for money of a project cannot be attained if the science is not consistently of high quality. Generally, science is better if high levels of detail (and thus thought and planning) are required pre-funding. In particular, few proposals had sample size calculations or gave convincing accounts of plans for data analysis. This may be of concern as the difference between excellent and weak science can lie in these areas.

It was noted that some of the lower quality projects had a high budget compared to what would be found in other settings but it may be linked to the higher price levels in in Norway. For example, the cost of a 3 year PhD studentship in Norway was budgeted in one proposal as 10 times more than that in the LMIC of the study. This would suggest better value for money by supporting more LMIC PhDs and post-docs in projects.

Finally, it was noted that projects often had consistent scores across all the six dimensions evaluated by the experts, which can be explained by the fact that a well-written proposal or progress report provide the necessary detail to conduct a high quality scientific project, including structure and management, often leading to better value for money.

D.4 SWOT analysis of the GLOBVAC2 programme by the Expert Panel

Experts were asked to assess the current strengths and weaknesses of the programme as well as the opportunities and threats in future.

D.4.1 Strength of the programme

The GLOBVAC programme represents a balanced portfolio of high quality scientific projects with good methodological approach and implementation. Most projects focus on important health issues that have the potential to provide concrete outcomes. There is a strong presence of intervention programmes and scale-up programmes based on proven efficacy trials. The thematic areas are aligned with global priorities and needs, and allow the funding of diverse research questions and innovative concepts. Funding portfolio and its broad priorities make this a flexible programme, which is very valuable for researchers. There is a good mix between academia, research institutes and companies.

The programme fosters crucial collaboration nationally and internationally, to help build capacity predominantly in Norway. GLOBVAC also fosters capacity development and effective partnerships in LMICs, providing training and project supervision from the Northern partners. The programme can be considered a flagship funding initiative from Norway, promoting interest in global health, establishing and building collaborations with policy makers at government and NGO levels. The programme reflects excellence of the Norwegian science.

D.4.2 Weakness of the programme

The GLOBVAC programme consists of a number of research projects that are poorly presented in current proposals and progress reports. The proposal format appears to make the writers concentrate more on the background to the work and literature review than on detailing the methods – this is more understandable for PhD studentships – but often actual research approaches are only briefly described. This may lead to inconsistencies in the peer review processes and result in some weaker projects. In particular, a few projects are based on optimistic assumptions with risk of implementation delays and early failure. One expert noted the absence of a dedicated oversight or advisory committee.

The programme's priority areas seem narrower than justified when matching with the health patterns and health system needs in the current global health agenda. There was little evidence of newer implementation science thinking and many project that claim to be health systems research projects

did not really tackle health systems questions or employ any theories. The lack of strong 'end user' engagement was noted.

The programme seems to support shorter-term projects. These give neither enough room for building strong research environments, nor do they serve as incentives for young researchers to enter into global health collaborative ventures. Some of the more clinical research, notably some PhD studentships, seemed somewhat poorly developed.

The equity in collaboration is still skewed among senior researchers and supervisors. Experts considered that engagement of LLMIC and capacity development for LLMIC are limited. Opportunity to engage with international organisations, funders and partnerships was also not fully exploited. Finally, the Expert Panel expressed the view that the GLOBVAC programme still has a limited visibility to global community.

D.4.3 Future opportunities

In thinking about the thematic priority areas for GLOBVAC, a stronger alignment with international research priorities, eg with the new SDGs, would put the programme right into the international arena. This would however require strengthening of the interdisciplinary component of projects as a major criterion for funding. Nevertheless, some of the thematic areas covered in GLOBVAC are often omitted from those of other funders yet are important priorities, eg mental health in LMICs, so there is a chance to make a difference.

There are further opportunities in linking up with (and showcasing GLOBVAC's projects to) other global health funders and networks to support larger, multidisciplinary and transnational grants with linked projects that may deliver a more complete body of research within a reasonable timetable. In such grants the expertise in Norwegian institutions might be complemented by expertise from elsewhere to foster mutual capacity building. This type of schemes would also enable multi-national collaboration that can offer added areas of expertise for Norwegian researchers and increase the programme's international visibility.

For example, it would be crucial that future projects linked to clinical trials and related research in African countries are better aligned to EDCTP2 priorities, thereby focussing the investments on well defined priority research, and for further building capacity and training in African countries. In addition, linking up with a new initiative on Host-Directed Therapies and improve treatment outcomes of TB, including therapeutic vaccines development, is a real opportunity. There is also prospect in linking up with longitudinal surveillance sites in LMICs in the interest of cost-effectiveness and to better enable cross-site research endeavours and south-south collaborations. See for example the INDEPTH network of longitudinal demographic surveillance for basic epidemiology and socio-medical studies but also for intervention programmes and clinical trials. Shared global health commitment and infrastructures in the Scandinavia would also produce cost saving, leverage resources and create new research alliances.

Future PhD twinning projects (with supervisors on both sides) could be seen as a means of cross-cultural collaboration among young scientists and building of the future cadre of global health researchers in Norway. Training for basic researchers in Norway about product development would also enhance the effectiveness of the programme.

There has been substantial funding available in GLOBVAC and if maintained would offer continued opportunities to advance scientific knowledge through well-supported proposals. The programme could then fund innovative projects by building in stop/go moments based on optimistic assumptions.

D.4.4 Potential threats

There are a number of potential threats experts have highlighted based on the review of the programme portfolio.

The quality of projects must remain consistently high across the thematic areas. If that does not happen, funded research may not deliver the expected value to science in Norway and internationally. Proposal length is considered short compared to the sums disbursed and insufficient specificity of proposal content may lead to projects falling behind schedule and not delivering any significant output. The absence of involvement of dedicated oversight committees or data monitoring and safety committees may contribute to such negative outcomes.

The projects must stay relevant to end users, including affected communities, governments and policy makers. With the focus shifting to sustainable development goals the findings from MDG oriented research may be less visible. Will the politicians who finance the scheme lose interest?

The methodologies applied in the projects need to stay cutting edge; many spheres, including in health systems, methodologies are changing quickly. It may be hard to sustain leading research without good international links to other higher income settings that can permit more rapid sharing of ideas and developments. Nevertheless, a major threat to any programme in global health is that without major involvement of developing countries (LLMIC) in programme design and equitable partnership the programme becomes less than relevant.

Experts also consider the absorptive capacity in Norway for well trained global health graduates potentially a limiting factor and whether it provides an attractive career so that the programme continues to get the best applicants. One possibility is to expand the scope of the programme and include projects covering the new agenda of double burden of communicable and non-communicable diseases in developing countries.

Finally, experiences from Sweden point to a diminishing critical mass for global health research for the next generation of global health researchers. This may be a consequence of Swedish Development Assistance shifting away from its collaborative support for Swedish researchers. GLOBVAC and its funders should heed advice and not fall in the same trap.

D.5 Recommendations from the Expert Panel

Members of the Expert Panel regarded the current strategy to be excellent and would suggest retaining it. The programme does not need big changes and will no doubt continue with fostering excellent science. However, based on the arguments above, the Panel suggests the following changes to be considered for the future of the GLOBVAC programme (Note these recommendations are not necessarily those of the evaluation team):

1. *Proposals should only be considered for funding where they provide an outline of the research methods. If the proposal is for a series of studies and thus further page length is required it would suit better for incremental funding, so that what is funded is properly described, or else page length extension for large amounts could be agreed to. GLOBVAC programme should be more directive about this and a sample size calculation and plans for data analysis should be mandated for every proposal.*

2. *Align better GLOBVAC thematic priorities with those of the new Sustainable Development Goals (SDGs) and major global health funders, networks and initiatives. Try also to align the research portfolio with health problems, using burden of disease data.*

3. *Encourage and support interdisciplinary working in research projects and make it more essential among the evaluation criteria.*

4. *Consider providing closer project supervision by establishing oversight committees or data monitoring and safety committees.*

5. *Create stronger focus on improving capacity for health systems work that impacts on maternal, neonatal, child and adolescent health. This is crucial as while there will always be a need for better interventions, optimising health systems to deliver key aspects of quality care equitably*

and at scale are the challenges of the coming decades. This will also require a solid methodological base and may necessitate new centres of excellence to be developed, even if virtually, with strong international linkages.

6. *Expand the research programme focus on the emerging "epidemic" of non-communicable diseases, as well as mental health and violence, as part of recognised global health burden.*

7. *Emphasise early engagement of end-users in project design, including local communities, international and local policy makers. This will translate into implementing any positive results directly into policy and practice.*

8. *GLOBVAC should put more effort to increase its global visibility as currently many international researchers are unaware of the huge investment Norway is contributing to global health R&D. Showcasing their projects at EDCTP, TB Union, WHO STOP TB meetings and at other founders' events should be expanded.*

9. *Co-funding with other global health funders and networks to support larger, multidisciplinary and transnational projects with potential to respond to important priorities and deliver a more complete body of research within a reasonable timetable. In such cases the existing expertise in Norwegian institutions will be complemented by expertise from elsewhere (including LMICs) to foster mutual capacity building and broaden geographical coverage.*

10. *Expand capacity building in LMICs and supporting excellent research environments. It is critical that all projects have a strong capacity development and training aspect for LMICs included. This would provide better value for money for many projects and through equitable partnership more relevant projects could be conducted. Ideas will have to come from LMIC partners as much as any Northern investigator as research must reflect context and be cognisant of wider political changes. For example, twinning of Southern-Northern (Norwegian) PhD students and collaborations at post-doc level with senior supervision in place on both sides within the same project could be initiated. This is not only effective project management but also fostering of cross-cultural understanding.*

Assessment form

Expert review of the GLOBVAC2 research project portfolio

The scope of the review will be the evaluation of the effectiveness and relevance of the GLOBVAC2 research activities by reviewing the projects started since 2012.

The GLOBVAC programme aims at supporting high-quality research with potential for high impact that can contribute to sustainable improvements in health and health equity for poor people in LLMIC. The objectives of the GLOBVAC2 programme are to:

- Develop and support internationally competitive and sustainable public and private research groups and institutions in Norway;
- Develop and support national and international research collaboration and partnerships;
- Secure capacity building through developing and supporting partnerships with research groups and institutions in LLMIC;
- Inform and increase awareness among policy makers, researchers and the public about the needs for, and results from, global health research.

The review will be based on documentation provided to the experts, project proposal and the latest progress report (in English), as well as contextual information known to the expert panel. Two experts will assess each project independently using the present assessment form and return it to Technopolis preferably before the end of November 2015. The study group will then synthesise this information into a standalone report about the ongoing GLOBVAC2 research project portfolio that can then be reviewed by the expert panel.

The assessment will involve experts to allocate a summary score for each relevant dimension and provide a brief explanatory comment. We propose using the following scale:

5: Internationally excellent
4: Internationally visible
3: Nationally good
2: Nationally not good
1: Very poor

The expert review will address the following dimensions of the project as laid out in the following sections of the assessment form:

- Scientific quality: strengths and weaknesses;
- Impact: actual or potential impact based on results and outputs;
- Relevance to current knowledge gaps in global health research;
- Added value to capacity building in Norway and internationally, including LLMIC;
- Project implementation;
- Suitability of resource allocation.

We would like to ask you to use this form to record your responses for each project, as this will greatly help the preparation of the final synthesis report.

Project title: XXXX Project number: XXXX
1. What is the scientific quality of the project with regards to the international landscape?
Rate using a scale 5 (high) to 1 (low): X
Please comment on the project's strengths and weaknesses:
2. What is its actual or likely impact on science (based on current results and outputs)?
Rate using a scale 5 (high) to 1 (low): X
Comments:
3. What is its relevance to current knowledge gaps and priorities in global health research?
Rate using a scale 5 (high) to 1 (low): X
Comments:
4. What is its added value in terms of capacity building in Norway and internationally, including LLMIC?
Rate using a scale 5 (high) to 1 (low): X
Comments:
5. Is the structure and management of the project (ie implementation) appropriate to meeting international norms?
Rate using a scale 5 (high) to 1 (low): X
Comments:
6. To what extent does it represent value for money (please consider the suitability of financial resources provided to the project)?
Rate using a scale 5 (high) to 1 (low): X
Comments:
7. Do you have further comments regarding the project?
Comments:

Please confirm the thematic priority category/is relevant to the project by placing an X in the relevant line(s):	
	1. Prevention and treatment of, and diagnostics for, communicable diseases with particular relevance for LLMIC.
	2A. Maternal, neonatal, child and youth health.
	2B. Family planning and reproductive health
	3. Health systems and health policy research
	4. Implementation research (research on the promotion of uptake of research findings into public health programmes, and strategies for scaling-up of effective health interventions and health services).
	5. Innovation in technology and methods development for maternal and child health in settings where appropriate technologies are not available or non-existing.

Please complete the following sections only when you have finished with the individual project reviews:

Final conclusions and recommendations
Overall performance of the GLOBVAC2 programme
Please provide comments based on your project reviews how *overall* the programme is aligned with international research priorities and needs; and whether the funding schemes and resources have been utilised optimally to meet the aims and the thematic priorities of the programme?
What should be the main thematic research direction of GLOBVAC2 programme as part of its future strategy?
Overall recommendations for the future of the GLOBVAC2 programme:

SWOT analysis of the GLOBVAC2 programme

Strengths:	Weaknesses:
Opportunities:	Threats:

technopolis |group| The Netherlands
Spuistraat 283
1012 VR Amsterdam
The Netherlands
T +31 20 535 2244
F +31 20 428 9656
E info.nl@technopolis-group.com
www.technopolis-group.com

The Research Council of Norway
Drammensveien 288
P.O. Box 564
1327 Lysaker

Telephone: +47 22 03 70 00
post@rcn.no
www.rcn.no

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