Knowledge for better health

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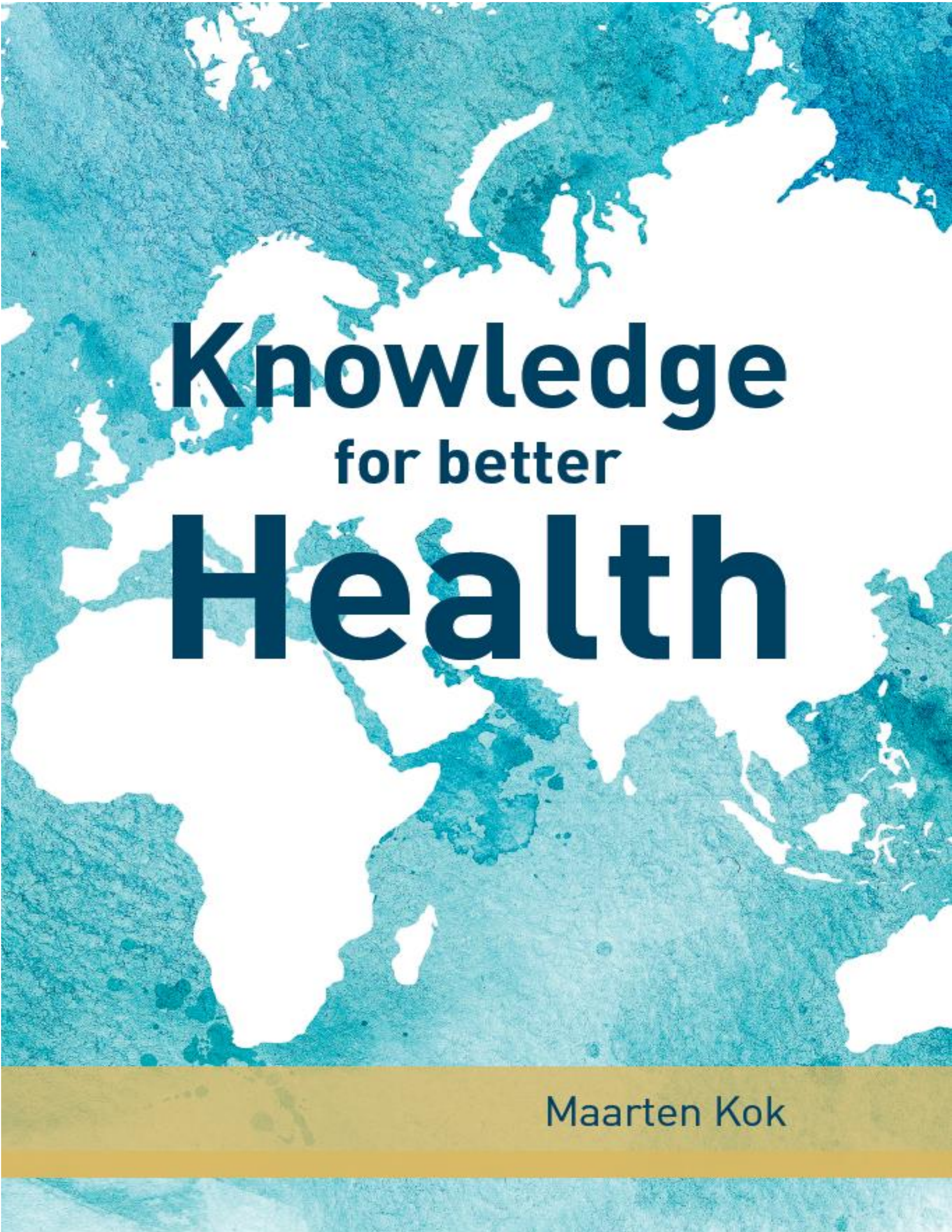

Knowledge for better Health

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KNOWLEDGE FOR BETTER HEALTH

How can we enhance the impact of research?

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad Doctor aan
de Vrije Universiteit Amsterdam,
op gezag van de rector magnificus
prof.dr. V. Subramaniam,
in het openbaar te verdedigen
ten overstaan van de promotiecommissie
van de Faculteit der Bètawetenschappen
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De Boelelaan 1105

door

Maarten Olivier Kok

geboren te Hoorn

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Chapter 1

Introduction: knowledge for health in the 21st century

Knowledge for health in the 21st century

Science has contributed to dramatic improvements in health worldwide. From vaccines to insulin, antibiotics to anesthetics, X-rays tot MRIs, scientific research has an impressive history of identifying and analyzing health problems, making diagnosis, articulating prescriptions and mounting effective responses. Research has also helped to develop and organize more effective, efficient and equitable health systems, mobilize and allocate funding for health and improve access to care. The application of knowledge from research has prevented a tremendous amount of suffering and misery, and allowed billions of people to live longer, healthier lives.

During the past decades, investments in research for health have increased rapidly from an estimated 30 billion USD during the mid-eighties, to probably more than 300 billion USD in 2018 (Røttingen et al. 2013; Young et al. 2015). More than half of this 300 billion comes from governments and philanthropists, who fund research primarily to contribute to improving action for health. This rapid growth does not just take place in high-income countries. A growing number of governments in low and middle-income countries is also convinced about the strength of the scientific method and the potential of organized knowledge production, and is rapidly increasing its investments in research for health.

While the investments in research, and the expectations of its benefits, grow rapidly, there are also constant signals of problems and disappointments with the relevance, acceptance and use of research-based knowledge. Researchers and those who identify with their results report that a lot of valuable knowledge and applications are hardly used, or only after a long time. In numerous publications, they point to the gap between today's scientific advances and their application: between what is known and what is actually being done (Attaran et al. 2004; Gage et al. 2018; Gladman et al. 2016; Haines, Kuruvilla, and Borchert 2004; Hunter 2019; Institute of Medicine (US) Committee on Quality of Health Care in America 2001; Jones et al. 2003; Lewis 2005; Ritchie and Keech 2001; World Health Organization 2004).

The rise of the Evidence Based movement has been an important catalyst for describing this gap between knowing and doing. The Evidence Based movement promotes the use of research in decision making and has developed a distinct approach for evaluating interventions, appraising evidence and formulating recommendations. These evidence-based recommendations have been a starting point for the identification of gaps between what is 'known' and what is actually being done. While the rhetoric about these gaps may require some nuancing, these know-do gaps are clearly a global problem (Institute of Medicine (US) Committee on Quality of Health Care in America 2001; Jha 2002; Lenfant 2003). Studies have shown that up to half of the patients in the United States and Europe are not receiving care according to best scientific evidence (Institute of Medicine (US) Committee on Quality of Health Care in America 2001). The situation in low-income countries is even more worrying (Jha 2002). A major study on child survival concluded that 60% of the 10.8 million deaths among children could be prevented by effective and affordable interventions, such as a simple solution of sugar, salt and water that helps a child survive diarrheal disease (Jones et al. 2003).

While a lot of research-based knowledge is insufficiently used, there are also signs that research is not well suited to the needs of patients, health professionals and other stakeholders, and that many problems and challenges that they are struggling with are rarely investigated (Chalmers, Rounding, and Lock 2003; Macleod et al. 2014; Utzinger and Keiser 2013; World Health Organization 2004). Researchers in the health sector are incentivized to focus on innovative, well-defined, short-term solutions and well-measurable indicators that fit into a grant proposal, can be tested in well-arranged trials and that can be published in leading journals (Wolffers 2000). The focus on constantly new, separate interventions for downstream causes can lead to valuable insights, but may also gaslight impacted populations, by implying that old known solutions do not work, and diverting attention from more fundamental causes and structural determinants of health, such as poverty, social inequality and discrimination (WHO Commission on Social Determinants of Health and World Health Organization 2008). While researchers in both the public and the private sector are focusing on the next novelty, much less attention is paid to implementing, scaling up and further developing known solutions and interventions and the strengthening of health systems (Ghaffar et al. 2017; World Health Organization 2004). A further issue is that research is clearly shaped by the voice of academia and financial interest, while other voices, of patients, frontline health workers and a variety of marginalized groups tend to be ignored.

A related problem is that the public seems to be less and less inclined to accept the results of research. In a lot of countries there is growing distrust in research-based recommendations on vaccination, various medicines and healthy food, and increasing skepticism about the role of experts in public life (Pollack 2005). Various incidents where governments withheld research information, such as BSE / Mad Cow Disease in the UK, SARS and tainted infant formula in China, and Ebola in West Africa, highly published cases of scientific fraud, and the increasing mix of science, business and industry have confidence in science further eroded (Bellaby 2005; Delamou et al. 2017; Pollack 2005; Qiu et al. 2018). The perception that research is disconnected from immediate public health needs, and that researchers are primarily focused on their personal interests, publication records and profit, instead of their ethical, moral and social responsibilities, has further increased distrust (Callahan 2003).

In the health sector, there have been all kinds of attempts to address the problems and disappointments with the relevance, acceptance and use of research. Initially, attempts to promote the use of research focused primarily on better communication of results to intended users (Berwick 1998). While important, attempts to improve the communication of research also proved insufficient (Berwick 1998; Green et al. 2006; Grol et al. 2013). Studies showed that ad-hoc communication of results, recommendations and guidelines had little impact on their use (Haines et al. 2004). Effective communication required sustainable interaction and trust, and a communicative infrastructure that allows people and relevant knowledge to travel and interact (Schein 1987; Whyte and Whyte 1989). New approaches to improve the contribution of **k**nowledge production **t**o **a**ction (in this thesis, I refer to the process of knowledge production and its use as 'KtA') focused on improving the interaction between researchers, users and other stakeholders (Best and Holmes 2010). Various initiatives tried to link the actors and communities that played a role in the production and application of knowledge, support them with gaining insight into each other's needs, perceptions and values and help them to coordinate their practices (Boyko et al. 2012; Wolffers 2000). Stakeholders, such as patient representatives, health workers and policy decision makers were involved in setting research priorities, conducting research and interpreting and applying results (Abma et al. 2017; Boaz et al. 2018; Wolffers 2000). Other initiatives focused on the way in which users combined generic recommendations with local knowledge and expertise, and strengthening the system of actors, infrastructures and institutions involved in the production, transfer, synthesis and use of research (Budrionis and Bellika 2016; Lavis, Boyko, and Gauvin 2014; Pang et al. 2003).

Although these new approaches contain all sorts of valuable elements, the problems with the relevance, acceptance and the use of research, and the discussion about the ethical, moral and social responsibilities of researchers, do not seem to diminish (Oliver and Boaz 2019). A possible explanation for the persistence of these problems and the limited success of new generations of KtA approaches is that they implicitly or explicitly build on a too simplistic perspective on how the production and application of knowledge can contribute to better action for health. In the health sector, the prevailing ideas about how KtA processes evolve have been shaped by heroic success stories in which research led to dramatic health gains. These appealing narratives are reinforced by the supporters of the Evidence Based movement. While these evidence enthusiasts have tried hard to promote the application of research based knowledge, they have often ignored insights into KtA that have not been developed in their own 'knowledge for health' sub-field (Greenhalgh 2010; Oliver, Lorenc, and Innvær 2014).

For long, scholars in diverse fields such as science and technology studies (STS), cognitive psychology, management and innovation studies, philosophy of science and epistemology have written extensively about how knowledge is created, transferred and used and how research and innovation processes work in practice (Callon, Law, and Rip 1998; Dewey, Nagel, and Boydston 2008; Felt 2017; Fleck et al. 1979; Hackett 2008; Hacking 2001; Latour 1987a; Polanyi 1958; Rip 1986; Everett M. Rogers 2003; Sismondo 2010; Sloman and Fernbach 2017; Van de Ven, Angle, and Poole 2000; Weiss 1980). These scholars have conducted a large number of detailed empirical studies into knowledge practices in all kinds of sectors, including the health sector. Together, these studies offer a rich mosaic of insights into the nature and dynamics of knowledge, which shows that the ideas and stories about the functioning and success of KtA processes that are dominant in the 'knowledge for health' field are too limited. While this mosaic of insights has been available for years, few attempts have been made to bring them together in an explicit, empirically grounded perspective that describes how knowledge is produced, transferred and used, and ultimately contributes to better action for health (Oliver and Boaz 2019). It also remains unclear to what extent such a richer, alternative perspective can help to better understand and address the persistent problems and disappointments with KtA and help to better harness the transformative power of knowledge for health.

In this thesis, I attempt to bring together a selection of the most relevant insights and try to integrate them into a coherent, empirically ground and useful perspective that provides insight into how knowledge is produced, transferred and used to contribute to better action for health. In various cases in different countries, I explore how this perspective can help to analyze problems with KtA. In addition to using these insights for analyzing diverse cases, I also try to contribute to constructing new insights and methods, which are intended to increase the likelihood that investments in research contribute to improving health.

This introduction continues with exploring the background of some of the key problems with KtA in the health sector. I will first lay out how KtA processes are linearized and how this relates to a concentric approach to dealing with complexity. I then introduce the Evidence Based movement as a heuristic to learn more about the successes and problems related to linearization. After exploring how linear KtA approaches can lead to problems and disappointments, I provide a sketch of how, during the past decades, the quest for more productive approaches to KtA has evolved. I describe how problems with a purely linear approach to KtA have inspired the development of interaction approaches and more recently systems approaches. I argue that, while these new approaches contain important steps forward, they are still problematic due to their reliance on a modernist – cannonball like – perspective on the dissemination and implementation of knowledge. I continue with presenting a selection of empirically grounded insights into KtA, including a specific characterization of the nature and dynamics of knowledge. Embedded in these existing insights is a phenomenological theory of KtA, which I try to draw out and present as a 'pragmatist process perspective' on KtA. Using this perspective, I will reinterpret the functioning of the Evidence Based movement and reconsider the notion of KtA. I will then introduce the analytical focus and methodological approach of this thesis and provide an overview of the succeeding chapters.

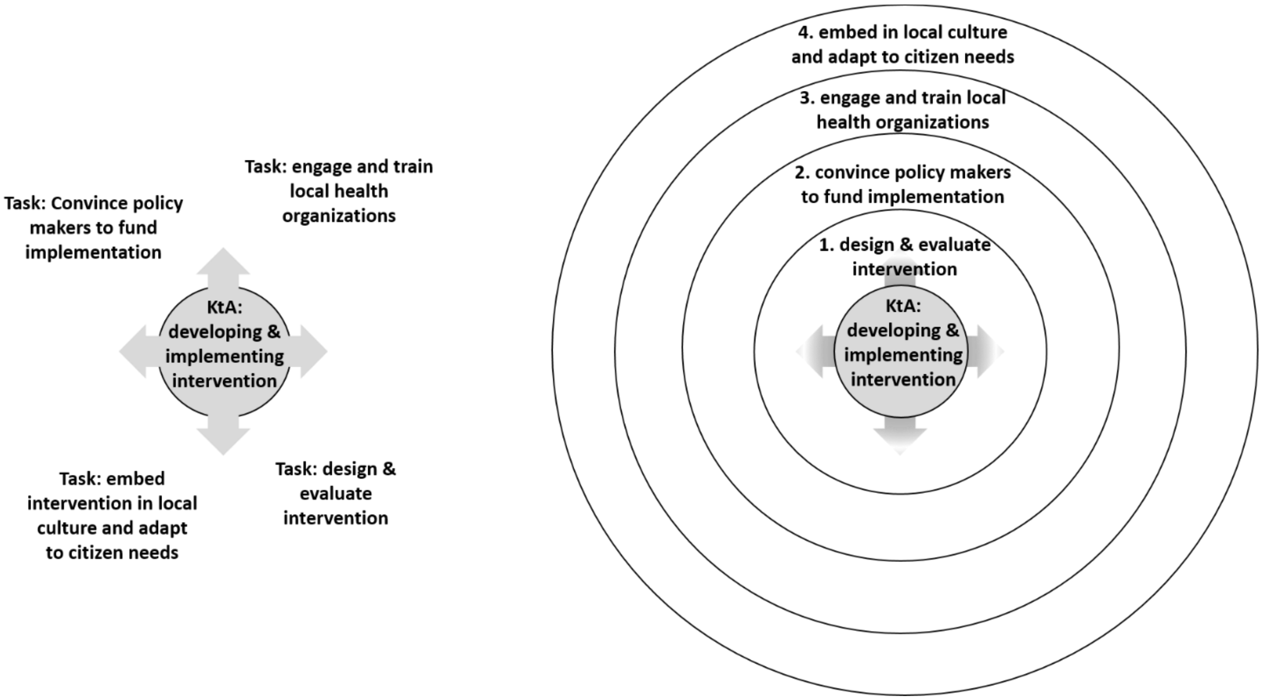
Evolving thinking about KtA

KtA processes are linearized

In the health sector, as well as in other parts of society, the development of KtA processes is explicitly or implicitly described as a linear process. This standard view, which is usually held implicitly rather than espoused explicitly, sees a central authority transmit universal messages and best practices along an evidence transmission belt to passive users who are encouraged by incentives, nudges and even shaming, to get the 'message' and change their actions. The stereotypical image of a linear, step-by-step, rational, and isolated process can be seen in the health sector in for instance the literature on the use of research, diffusion of innovations, quality assurance and intervention development (Bartholomew, Parcel, and Kok 2001; Brug et al. 2010; Davis et al. 2007; Nullis-Kapp 2004). Various authors have shown how in a linear KtA model new knowledge – preferably from 'rigorous' research – is identified as the point-source of improvement (Latour 1987a; Rip 1992). First, a 'good' knowledge construct, such as a new fact, novel procedure or medication, must be produced and then, from that new knowledge construct, good action will follow (albeit under the condition of further 'implementation' efforts). In a linear model, KtA processes are sequential and proceed in one direction, as a cannon shooting knowledges into the world of action. The linear model is linked to a *modernist* account of science and innovation, in which the nature and dynamics of knowledge is similar to that of a cannonball: knowledge is depicted as an external, immutable and context-independent construct. Such knowledge constructs have impact by coming in from the outside, diffusing and being taken up for their overt function (Latour 1993b). Intuitively, the cannonball view seems the natural one. New facts, articles, diagnostics or medications may seem to come from elsewhere, having an inherent meaning or function. In the standard view, these knowledge constructs have a material manifestation and can be seen as tangible, moveable items that are themselves regarded as a source of impact.

The linear KtA model corresponds with a concentric perspective on the environment in which actors want to contribute with knowledge to action (Deuten, Rip, and Jelsma 1997). To illustrate the idea of a concentric approach, we can take the development and implementation of a lifestyle intervention program as example. Actors involved in developing and introducing a new intervention will have to anticipate the selection environment and context in which it is supposed to function. An intervention, for instance, should achieve its intended effects (e.g. reduce obesity), but also needs to be affordable, supported by the local government, embedded in local public health centres, enacted by competent health promotion professionals and aligned to local culture, etc (see fig 1 left).

***Figure 1**: A concentric approach to KtA processes*



KtA enactors face many tasks (left) and approach these tasks by following a stepwise concentric approach (right) (inspired by Deuten 1997)

The insiders who try to enact the KtA process cannot address all these factors, tasks and challenges at the same time. To deal with this complex and diverse environment, the KtA enactors view it as concentric layers surrounding the KtA process, which are approached and dealt with in consecutive steps – first this, then that – (see fig 1 right). A concentric approach generally starts with producing a knowledge construct that is 'good' according to the perspective of the intervention developer (often backed up by research). As a second layer, the KtA enactors may try to convince the Ministry of Health to support and fund the nationwide implementation of the intervention. As a third layer, local governments and public health organizations may be approached as part of an implementation strategy, brochures and posters are sent out and local health professionals are trained. As a final layer, the embedding in local culture and needs of citizens are considered.

A concentric approach reflects an important aspect of KtA: that of researchers and other insiders developing new knowledge constructs and 'pushing' them into practice. A concentric view is also a partial view, as it is linked to the perspective of the KtA enactors, instead of the perspective of unsuspecting ‘outsiders’, for whom the new intervention may be a welcome solution, but may also be an unwanted intruder (Garud and Ahlstrom 1997).

The Evidence Based movement reinforces the linearization of KtA

The Evidence Based movement is interesting for our analysis because it systematically linearizes KtA paths, promotes a concentric approach and has deeply influenced the way KtA is perceived and organized in the health sector. The Evidence Based (EB) movement emerged from efforts to improve health care by basing it on the best available evidence. To support this aim, scholars developed a specific approach for producing and appraising evidence and using it in practice, that we refer to as the *linear-EB approach*. While the ideal of the Evidence Based movement is to base practice on the best available evidence, it is through the *linear-EB approach* that the Evidence Based movement has proliferated and become institutionalized (Bal 2017). Even though the practices of the movement have continued to evolve, the *linear-EB approach* remains its core. This specific KtA approach has a number of features that reinforce linearization: 1) it presents research (evaluations) as the point-source of improvement, 2) it attempts to centrally assure quality, 3) it treats knowledge as immutable, value free and context-independent products and 4) it encourages practitioners to accurately replicate evidenced based constructs in practice (while considering patient preferences) (Sackett et al. 1996).

An important reason for this linearization is that the research designs and evidence appraisal methods that the Evidence Based movement promotes relies strongly on measuring input-output relations in controlled circumstances (Pawson and N Tilley 1997). In RCTs and related study designs, attempts are made to eliminate external influences by randomization, controlling contexts and blinding of researchers and participants after which effects are precariously attributed to a manipulation, such as a pill or surgical procedure. Because unknown biases and circumstantial influences can never be excluded, the *linear-EB approach* emphasizes that multiple evaluations should be conducted, of which the results are concatenated in systematic reviews and/or combined in meta-analysis (Berwick 2005). These results are further aggregated in consensus conferences to design authoritative statements, recommendations and guidelines. From these central arenas, knowledge constructs are pushed outwards, into policy and practice, following a renewed concentric approach.

The *linear-EB approach* assumes that the effectiveness claims *become* locally valid in case of *accurate replication of the input-output relation* (Pawson and N Tilley 1997). To produce the same input-output relation, and thus make knowledge valid in new situation, one has to reproduce the circumstances in which the knowledge was produced, such as the circumstances in the lab or trial. The *linear-EB approach* thus prescribes that the circumstances in which knowledge is produced should dictate the circumstances of application.

An advantage of relying on input-output causality is that useful cause-and-effect knowledge can be produced without a comprehensive understanding of underlying mechanisms. This has allowed doctors to effectively use medicine such as chlorpromazine, which has been used for decades to treat patients with serious psychiatric illnesses, while the mechanism of how it worked remained a mystery (LeFanu 1999).

A disadvantage of the unilateral dependence on input-output causality is that it can be difficult and risky to use such knowledge. To achieve local validity, accurate local replication of the configuration that produced the input-output sequence is required. Identifying and/or realizing such replications can be difficult and risky when little is known about how the input-output configuration works and how it depends on specific circumstances (e.g. changes in nutritional status influencing the effect of immunization). The unilateral reliance on input-output causality, combined with the attempt to centrally assure quality, has as a result that the *linear-EB approach* has to treat knowledges as immutable and has to insist on accurate replication during use. A consequence of relying on the *linear-EB approach* is that the focus of the Evidence Based movement has shifted from improving health care to the production of a specific kind of knowledge, which then has to be accurately replicated in practice. To this purpose, alongside the Evidence Based movement, new disciplines have evolved, such as 'implementation science', that take up the role of reproducing contexts in which knowledge construct can be effective (Grol et al. 2013).

Linear KtA approaches lead to problems and disappointments

In the health sector, important successes, disappointments and problems are attributed to a linear KtA approach. The short history of the Evidence Based movement provides numerous examples. The systematic evaluations that were promoted by the movement showed the risk of relying on unguided human impression. Widely used clinical practices, such as theophylline for asthma, gastric freezing, radical mastectomy, and dozens of others wilted under the microscope of properly designed clinical trials, proving no better than simpler practices or even harmful (Berwick 2005). The *linear-Evidence Based approach* had many advantages: the specification, standardization and documentation of processes provide an efficient, fairly convincing and transparent way of producing evidence. Standardization enhanced productivity. It helped to combine the results from scattered expertise and limited resources and build an edifice of transferable knowledge on precarious experiments of limited scope. The produced evidence helped health workers and other stakeholders to choose for the most effective treatments, interventions or policy options. It was also very attractive for insurance companies, quality control agencies, etc.

With the increasing amount of evidence, the problem emerged that the new knowledge was not automatically used in policy and practice. It often took longer than anticipated and required more work than expected to convince patients, health workers and policy makers to get the 'message' and change their actions (Haines et al. 2004). Intended users stated that the generic evidence provided did not necessarily match the specific cases and circumstances they had to deal with.

Leading scholars of the Evidence Based movement responded in a dualistic way. While they emphasized that evidence always had to be combined with the expertise of practitioners and patient preferences, and thus recognized the need for contextualization, they also stressed that evidence-based interventions, protocols and guidelines should be implemented as intended, because otherwise the evidence that supported their effectiveness would no longer be valid (Bopp, Saunders, and Lattimore 2013; McHugh, Murray, and Barlow 2009; Sackett et al. 1996). At the same time, the rhetoric about the slow uptake of research knowledge became more assertive. Disappointments about the use of research were described in terms of a *gap* between *knowing* and *doing* that had to be *bridged* and health professional who did not embrace the Evidence Based recommendations were singled out as laggards who resisted progress and were unable to implement.

An assertive approach seemed justified to eliminate harmful treatments and spread replicable practices with a clear added value. What was often neglected was that linear approaches only work as part of something larger: an active user, who has local knowledge and the competences and self-confidence to appropriate, combine and localize knowledge, additional efforts and interactions, trust, particular circumstances and the larger infrastructure required for transferring general knowledge (Dixon-Woods et al. 2011). Rather than strengthening the analytical capacity of users and empowering those who could serve as catalyst for change, an assertive approach implicitly suggested that users should act as passive clients who lack the intelligence, judgement and other cognitive skills that are required to take charge of their own learning process. The tendency to neglect or underestimate the need to make knowledge applicable, and the local knowledge and competences, additional efforts, resources and structures required for translating, integrating and using knowledge is a first persistent problem for linear KtA approaches.

Linear approaches also lead to problems when users assume that quality is an inherent characteristic of the produced knowledge, instead of something that is context dependent and has to be realized in local situations, which are never completely stable, controllable and known. There are numerous examples which illustrate the risk of assuming that evidence is inherently, and universally valid and applicable. A well-documented example is the application of the Evidence Based DOTS guideline for treating patients infected with tuberculosis in slums in Lima and prisons in Russia (Kidder 2011). While local health staff pointed out that the Evidence Based DOTS treatment failed to cure patients, the organizations who funded their work insisted that patients should be treated according to the DOTS protocol. After years of struggle and human suffering, local studies showed that drug resistant strains had emerged, and the Evidence Based protocol that had been so useful elsewhere, had worked as a resistance amplifier that was slowly causing an epidemiological nightmare (Furin et al. 2001; Shin et al. 2004). The DOTS example illustrates that quality and validity are not inherent characteristics of a knowledge claim, but dependent on the local situation, which can never be fully known and controlled.

Linear approaches also require that there is a relative consensus between the producers and users of knowledge about what is of concern, how valid knowledge can be constructed and who has a voice in determining that. A linear KtA trajectory is predicated on the partial closure of broader epistemic and methodological questions, such as theories about how effects emerge and should be measured (Von Schomberg 1997). Linear approaches also fail when intended users do not share the normative assumptions that are implicit in knowledge constructs. Researchers and other KtA enactors often fail to recognize that knowledge only seems objective and value free, because they take their own worldview for granted. Diverging ideas between researchers and patients, health workers and politicians about what is right, relevant and desirable are common and often the source of problems and disappointments with linear approaches. The initial rejection of cochlear implants by the deaf community, politicians' refusal to implement needle exchange programs and the opposition to condom use by the Catholic Church were not inspired by disagreement over research findings, but by diverging ideas about norms, values and needs (Byrd et al. 2011; Pisani 2008, 2010). A linear KtA approach can only work when the normative assumptions implicit in knowledge constructs are sufficiently shared between knowledge producers and users.

These problems with a linear KtA approach are linked to assumptions about the generalized applicability of knowledge and a neglect of what happens in the local situation. An additional problem for the specific *linear-Evidence Based approach* is that the way it produces evidence and judges its quality works only for specific problems. The combination of experimental research, reliance on chains of causality and the ideological hierarchy of evidence has worked well for studying linear, mechanical or natural, tightly coupled causal relationships, such as medical treatments in clinical care (Berwick 2005). The results have mostly been convincing for the intended users and the effective configurations, including the required circumstances, could often be reproduced in new situations.

In fields such as lifestyle related health promotion, quality improvement and health system development, the *linear-Evidence Based approach* has struggled with producing knowledge that is convincing and reproducible in practice (Baranowski 2006; Berwick 2008; Cohen et al. 2008; Green et al. 2006; Green and Glasgow 2006). Various authors point out that these fields require social change that often involves anticipatory behavior and tends to be nonlinear, multidimensional, normatively contested and deeply embedded in a complex social context (Berwick 2008; Cohen et al. 2008; Pawson and Nick Tilley 1997). These less controllable and dynamically complex processes do not fit into the reductionist scheme of the classic experimental method. An additional problem is that to produce generalizable effectiveness claims, local details about how something works and interacts with contexts are removed by randomization and blinding researchers and participants. This has frequently led to a lack of understanding of mechanisms and contexts, which hampers efforts to reproduce effective programs elsewhere.

Evolving thinking about KtA in the health sector

The problems and disappointments related to linear approaches have led to a wide range of analyses and new approaches to knowledge for health. Before we explore some of the emerged insights, it is useful to first consider how the quest for more productive approaches to KtA has evolved in the health sector. Inspired by Best et al, we identify three generations of approaching KtA in the health sector (Best and Holmes 2010).

The first generation consists of *linear approaches*. A linear KtA approach considers linearization of KtA and a concentric approach to dealing with the environment as the most desirable. Linked to linear approaches are attempts to centrally *assure* the quality of knowledge constructs, an emphasis on pure and objective facts, the inherent quality and immutability of knowledge constructs and their careful replication elsewhere.

In response to the problems with linearization, a second generation of so-called *interaction approaches* has emerged in the health sector. Empirical studies indicated that social processes were important for successful KtA (Best and Holmes 2010; Innvaer et al. 2002; Lomas 2000, 2007; Everett M Rogers 2003). Researchers therefore had to interact with potential users and establish relationships and networks. Potential users had to be consulted in setting research priorities, selecting research proposals, conducting research, interpreting findings and testing and implementing innovations (Wolffers 2000). In addition, 'knowledge for health' scholars increasingly emphasized that useful knowledge came not only from experimental research, but from heterogeneous sources, including the experiences of patients and professionals. These scholars also emphasized that knowledge had to be interpreted and adapted to be used in a local context (Cohen et al. 2008; Green et al. 2006).

While *interaction approaches* added important aspects to the linear KtA approach, they provided no new conceptualization of the nature and dynamics of knowledge. As a result, these *interaction approaches* comprise several inherent tensions, which lead to difficult questions. How could the modernist ideology of purified, value-free and universal 'facts' be reconciled with the opinions and experience-based knowledge of patients, health workers and policy makers? How could research from elsewhere be the point-source of local improvement when local interpretation and expertise played such an important role? How could the quality of knowledge constructs be centrally *assured* when such constructs were constantly adapted during use (Cohen et al. 2008)? In addition to these inherent tensions and a range of practical problems, *interaction approaches* struggled with the elusive role of context. Empirical studies showed that context could sometimes play a crucial role in enabling or constraining KtA processes, but *interaction approaches* did not provide a better way of understanding this role and dealing with context (Burchett et al. 2013; Dobrow, Goel, and Upshur 2004; Dopson and Fitzgeralds 2005).

In the late nineties, a third generation of KtA approaches started to emerge in the health sector, which can be described as *system approaches*. System approaches have been promoted especially by those working in situations in which other approaches were insufficient, such as in lifestyle related health promotion, quality improvement and research for health in low income countries (Green 2006; Pang et al. 2003). A system approach assumes that the productivity at the collective level not only depends on separate elements, but also on their relations. The National Health Research System (NHRS) framework seems the most widely applied system approach to KtA (D'Souza and Sadana 2006; Hanney and González-Block 2017; Pang et al. 2003). The NHRS framework prescribes that a combination of political will, stewardship, funding strategies, trained researchers, physical infrastructure and effective communication is required to contribute with research to action. Other examples are the Learning Health System (LHS) approach, which focussed mainly on the potential to learn from electronic health records and other routine data (Budrionis and Bellika 2016) and the Interactive Systems Framework (Matlin and Samuels 2009). The idea that politics, funding, human and physical resources and infrastructure influence KtA process adds important elements to earlier KtA approaches. A limitation of these system approaches is that they only describe some building blocks of a system, but fail to conceptualize how they interact and how they influence KtA. Moreover, systemic phenomena such as path-dependency, lock-in, emergence and co-evolution are ignored. Another shortcoming is that these system approaches provide no conceptualization of the nature, dynamics and use of knowledge. The active role of the users and the worlds in which they operate tend to be neglected. Implicitly, these approaches still seem to rely on the modernist – cannonball-like – view of knowledge and struggle with the same inherent tensions as the *interaction approaches*.

This brief sketch of the recent development in approaching KtA in the health sector raises a number of important issues. First, both the successes of linear approaches and the increasing awareness of their problems and limitations are striking. This combination of success stories and problems is important, given that the linear point-source explanation is clearly an inaccurate account of past achievements (Bal 2017; Latour 1993b). Second, in response to problems in practice, new approaches for producing and using knowledge have been developed. These *interaction* and *system* approaches provide wider *access* by engaging more actors and viewpoints, broaden the *scope* of problem definitions, increase the *heterogeneity* of knowledge production and add *contextual or system elements* such as political will, funding, human resources, infrastructure, etc. While adding important elements, these approaches still contain the problematic tensions of the linear approach. Third, despite the odd combination of successes and problems, the flaws of the linear point-source myth and an ongoing search for more productive approaches, there is little attention for the nature and dynamics of knowledge (Greenhalgh 2010). Key processes such as the 'production' and 'use' of knowledge and the way this interacts with 'contexts' and 'systems' remain black-boxed (Oliver and

Boaz 2019; Oliver et al. 2014). Even in the more enriched *interaction* and *system* approaches, knowledge is explicitly or implicitly depicted as an external, immutable and transferable object, in line with the intuitive story of the cannonball.

While impressive scientific progress is made and action for health continues to improve, the dominant perspective on the nature and dynamics of knowledge, and on how knowledge production and use contributes to better action for health, remains flawed. That seems increasingly problematic. Despite the important achievements, there continue to be serious problems with knowledge for health, such as the disappointing uptake and implementation of research-based knowledge, questions about its usefulness and its contribution to policy and practice, and worries that dominant KtA strategies have unintended effects, such as neglecting locally specific needs and marginalizing important knowledges (Bluhm 2005; Nugroho, Carden, and Antlov 2018; Rawlins 2008; Viergever 2013). Various authors have expressed concern about the dominance of randomized clinical trials and a too simplistic application of a hierarchy of evidence, and have pointed out the need to better understand when this specific strategy for robust knowledge production is the right one, and when other approaches are needed (Bluhm 2005; Rawlins 2008; Sackett 1989; Solomon 2011). A further reason for trying to better understand KtA practices is that the nature of health challenges is changing. The world is increasingly taking on more dynamic, complex and locally diverse health challenges that are deeply intertwined with a layered social context, involve diverging problem definitions and values and require anticipatory action, such as the obesity epidemic, increasing drug resistance, the HIV/TB syndemic, trust in vaccinations and the ambition to achieve universal health coverage while containing costs. For these dynamic, complex, increasingly global and ever more local health challenges, universally oriented KtA approaches and generic best evidence are important, but also insufficient.

To better learn to deal with these challenges, construct more effective approaches and contribute to robust action for health, it is essential to better understand how we produce, appraise, transfer and use knowledge. To contribute to this search, I will continue in the next chapter with laying out some empirically ground insights into the nature and dynamics of knowledge and KtA processes.

Chapter 2

Insights into knowledge practices

Lessons from empirical research into knowledge practices

For centuries, scholars have written about the nature, production, transfer and use of knowledge. Some prominent fields or disciplines in which this work can be found are philosophy of science, science and technology studies, anthropology, organizational sociology, innovation economics, management studies and public administration.

In this thesis, I make a distinction between the scholarly work about knowledge practices that is available in these existing academic traditions and the scholarly work that is part of a newer, refracted field that has emerged within the health sector, and which I refer to as the 'knowledge for health' field.

This somewhat separate 'knowledge for health' field started to emerge in the mid-eighties, together with the rise of the Evidence Based movement. Proponents of the Evidence Based movement were disappointed that the evidence that they produced was not used as fast as they hoped and studied how they could speed up and improve its implementation in clinical practice. Mostly, they viewed 'evidence' as a fixed product, and abided to a diffusion perspective on how evidence products spread throughout the health sector. While these 'knowledge for health' scholars have developed many practical methods and approaches, the perspective on the nature and dynamics of knowledge remains implicitly or explicitly rooted in the diffusion perspective which was popular in the mid-eighties.

In this thesis, I explore how a deeper understanding of the nature and dynamics of KtA processes can be used to improve research and learning practices in the health sector. Mostly, I draw upon insights from the somewhat diffuse, but empirical field of science and technology studies (STS). STS scholars use detailed ethnography, case studies and historical analyses to study how, within science and in others parts of society, knowledge is constructed, transferred and used (Sismondo 2010). Within STS, there is a strong focus on studying processes and practices and the emergence of larger, co-evolving layers and structures. Some important contributions are Kuhns introduction of paradigms that challenged the positivist philosophy of science, actor-network theory and the sociology of translation and the development of an epistemology that takes the role of social, cognitive and material processes in the production of knowledge into account (Kuhn 1996; Latour 1987a, 2007; Sismondo 2010). Key areas of STS that I will draw upon are studies of how knowledge, from different sources, is produced, becomes accepted and solidifies and how it is made applicable at other times and places (Bechera and Van der Ven 2007; Callon, Lascoumes, and Barthe 2009;

Callon et al. 1998; Collins 1992; Latour 1987a, 1993a; Polanyi 1958; Rip 1986; Schön 1983). Embedded in this rich mosaic of insights, is a phenomenological theory of knowledge and KtA, which provides an alternative to the linear point-source myth and the characterization of knowledge as fixed product that has the dynamics of a cannonball.

A pragmatist process perspective on knowledge and KtA

The approach to characterizing knowledge that I lay out in this section builds upon detailed analyses of the practices and processes through which knowledge is produced, including the work of scholars such as Callon, Rip, Latour, Lipton, Hacking and Polyani (Callon et al., 2009, 1998; Hacking, 2001; Latour, 1987a, 1995; Lipton, 2004; Polanyi, 1958; Rip, 1986; Schön, 1983). These insights can be linked to the work of Pragmatist scholars, such as Pierce, Dewey and Lindblom (Dewey 1957; Dewey et al. 2008; Lindblom 1965, 1990; Menand 1997). A central idea in Pragmatist philosophy is that the 'truth' of knowledge is not its universal validity but depends on whether knowledge works satisfactorily in concrete practices (Menand 1997). Knowledge is seen as a practical instrument that should help people deal with problematic situations and achieve their aims. The solidity of knowledge depends on its usefulness in offering a coherent understanding of the world, which can form the basis for human action. This perspective on knowledge fits well with how knowledge is viewed in the empirical field of cognitive psychology (Sloman and Fernbach 2017).

Before further developing this perspective on knowledge, I start with the more general idea that phenomena such as 'knowledge', 'expertise' or 'science' are historically contingent. This historical contingency means that what is currently seen as 'knowledge', is the result of developments in the past, such as the rise of empiricism and the 18th century Enlightenment, that could have evolved differently. This historical contingency implies that 'knowledge' does not have an inherent essence by itself, which can somehow be uncovered. Instead, one must follow a more modest approach and try to provide a perspective on knowledge that is linked to concrete practices at certain times, places and circumstances.

Taking into account this historical contingency, I try to offer a perspective on knowledge by using analyses of how, currently, within modern science, the health sector and in other professional and community practices people deal with knowledge. This perspective, tries to do justice to both scientific achievements and to the knowledge and expertise that is available elsewhere, in the health sector and in society at large, such as the professional knowledge of doctors, nurses and lab technicians and the experience-based knowledge of patients, for instance.

A well-rehearsed, but nonetheless important aspect of knowledge is the distinction between codified (external) and tacit (or implicit) knowledge (Polanyi 1958). Codified aspects of knowledge can be spoken and written and transferred as texts (but require special competences to be taken up). But as Polanyi has extensively illustrated, we know much more than we can say. While some know-how can be codified, a lot of what we know is tacit, and needs to be transmitted by special methods such as apprenticeships, guided learning by doing, internship, imitation and study tours. A significant part of the practices that are at the core of 'action for health' is in the form of practical know-how and cannot be codified. In the next section, I focus on the transferable, mostly codified aspects of knowledge. Key elements of this perspective can also be applied to more tacit aspects of knowledge in the form of skills and personal expertise.

Analyses of a diverse range of scholars show that, what in concrete practices functions as, and is seen as knowledge, is a precarious outcome of efforts to construct statements, or other kinds of inscriptions and make them applicable at other times and places, so that one can learn from one time or place to another, and act on that knowledge with some confidence (Callon et al. 1998; Latour 1987a; Polanyi 1958; Rip 2002).

In this brief description, some essential aspects of knowledge can be found. A first aspect is that knowledge has to do with *statements, or other kinds of inscriptions*, such as numbers, signs or pictures, that can be shared, picked up and used (Latour 1995, 1999). By packaging knowledge elements in the form of inscriptions they become transportable and can be acted upon later or elsewhere.

A second aspect of knowledge is that these statements have *some arguable validity at other times and places.*. This validity at other times and places is a typical characteristic of what is seen as 'knowledge' and provides an essential criterion for making a distinction between 'knowledge' and a conviction, opinion or direct observation (Dewey 1916; Rip 2002). Researchers, but also those who develop professional, craft and folk knowledge, try to transform local observations and experiences into constructs with a format, language and status that can more easily travel and is interesting and applicable later or elsewhere, so called cosmopolitan knowledge. The term 'cosmopolitan' is used to refer to the circulation of what originated as local knowledge and is having some validity at other times and places, without having to assume its inherent universality (Rip 2001).

The criterion of validity at other times and places provides and important goal for the production, stabilization and validation of knowledge. Researchers, and other knowledge producers try to construct knowledge claims that are valid later or elsewhere, and assess to what extent knowledge claims *work* as intended at other times and places. There are different ways in which knowledge can *work,* such as helping to explain how something works, which effect it has or helping to convince, for instance.

The claim that a construct has some validity at other times or places cannot be based on speculation, but requires an argument. An important argument for validity is that something has worked previously or elsewhere under circumstances that were sufficiently similar. Replication is not always possible however, and there are also other styles of reasoning that can offer an argument for the more generalizable validity of a knowledge claim (c.f. Wieringa et al., 2018).

A third aspect of knowledge is that these statements or inscriptions should not be seen as knowledge by themselves, but are functionally dependent upon a larger system of insights, considerations and competencies that is linked to a practice and shared by a community (Haas 1992; Tsoukas and Vladimirou 2001). Research findings, for instance, are linked to scientific practice within the academic community, and medical knowledge is linked to the professional practices shared by the medical community.

Based upon these insights and observations, I characterize knowledge as *inscriptions that have some arguable validity at other times and places and which are linked to a practice and a community.*

General patterns in the production of knowledge

To further develop this pragmatist process perspective on knowledge, I will zoom in on the practices and processes through which knowledge is produced. I do not start with assuming that there is somehow, somewhere, a domain of consensual ‘facts’ that can be tapped unproblematically. Instead, I start with actors who are confronted with an unknown and uncertain situation and who try to construct knowledge that has some validity and applicability. I inquire into how these practices evolve and, at least temporarily, some closure is achieved.

The production, sharing and use of knowledge are intrinsic parts of human life. People *search* for ways to comprehend the world in which they live and deal with problematic situations. Detailed analyses show that in the process of knowledge production, four general components can be identified: 1) circulation, 2) aggregation, 3) inference, and 4) attaining representation. These general components are visible in diverse scientific practices and in the de-facto search strategies through which other practitioners produce knowledge. Below I briefly describe each of these components.

Circulation

A first, general component in the production of knowledge is the circulation of items about which knowledge is produced (Latour 1987b, 1995). A simple example of such circulation is when several patients with similar ailments come to see a doctor, who can then acquire knowledge about conditions that are common among them (Rip1993). The role of circulation in the production of knowledge is clearly visible in the early years of the AIDS epidemic, when doctors in major cities in the US were confronted with multiple gay men who suffered from rare diseases and unexpected symptoms. Doctors who had seen multiple patients started to compare and link their experiences, noticed a pattern and speculated that a new disease had appeared. In this example, the circulation is unintended. Circulation can also be organized. Researchers travel to selected respondents to collect data about them, send out questionnaires or invite participants to visit a research center. The circulation makes it possible to collect data and bring it together in a so-called summation point, such as a data set.

Aggregation

Circulation does not yet lead to new knowledge. This requires aggregation, the second general component in knowledge production. The loose items that have been collected must be brought together selectively and aligned into a new meaningful whole. One way to aggregate is to name a case, experience, or specimen as belonging to a particular type or category (Schön 1983). In the early years of the AIDS epidemic, the role of naming in the production of knowledge is very visible. It was unclear which symptoms, conditions and cases were associated with the worrying new pattern. Doctors, researchers and others involved made various attempts to name and bring together relevant observations. Initially, doctors described the new pattern by the names of existing diseases that it was associated with, such as Pneumocystis Pneumonia or Karposi Sarcoma (KS), a rare form of skin cancer that caused red spots. Since most patients were actively homosexual, names such as Gay Cancer and Gay Pneumonia were introduced and started to circulate. When it became clear that patients suffered from all kinds of opportunistic infections, the name GRID was proposed, which stood for Gay Related Immune Deficiency. Others introduced the name KSOI, which combined Karposi Sarcoma with Opportunistic Infections, and did not link the disease symptoms to a specific population. After researchers learned that the syndrome did not only affect homosexuals, but also Haitians, hemophilia patients and heroin users, they coined the name the 4H-disease. In July 1982, a group of experts agreed that the disease pattern was an acquired syndrome that led to a deficient immune system, and voted to name it 'AIDS'.

The process of naming helped to bring experiences and observations together into a new entity and make them transportable to new cases and situations: the essential characteristic of knowledge production. The naming of a pattern also provided an occasion for generalization and abstracting, a first step towards the generation of theory and broader understanding

Inference

To develop understanding and scientific theories, it is insufficient to make simple generalizations. To generate understanding, a third general component of knowledge production is required: reasoning backward from an observed phenomenon to the best possible explanation. In science, the process of reasoning backward, or inference to the best explanation, is an essential step towards generating robust explanations and theories. It is a process that is guided by implicit and explicit criteria for what a good explanation is. To design an explanation that works, one will always start with insights and assumptions. Sometimes these are existing insights and assumptions, sometimes, these are geared towards the explanation that one has in mind. The designed explanation is then tested by further checks, collecting more data and trying out implications. The eventual explanation depends on the path of reasoning forward and backwards and the results of further tests. As is clear in Lipton, path dependency is inevitable (Lipton 2004). It is never certain whether an accepted explanation is actually the 'best explanation'. Others can follow a different path and may undermine an explanation with new data, other insights and further checks. STS scholars emphasize that, while there are degrees of solidity, the nature of knowledge production, the path dependency involved and the precarious shift from specific findings to more general knowledge claims always leaves openings for doubts and further checks (Collins 1992). Closure of the quest is a practical matter, not a logical step.

Attaining representation

Previously I showed that in the process of aggregation and naming, a new (social) entity was constructed (e.g. KSOI, Gay Cancer, GRID, 4H, AIDS). This 'label' functions as point-representation, and has the effect that the named aggregate can become mobile. To complete the transformation from local experiences into an accepted knowledge construct, this new entity must be 'given voice', so that it can stand in, and speak for the aggregate that it represents (Latour 1987b). This is the process of attaining representation, the fourth and final general component of knowledge production.

The process of attaining representation, (or 'giving voice') starts with naming, and thus mobilizing what was aggregated, allowing it to be taken up to other locations. To complete the transformation from a knowledge claim that is linked to an 'author' to an accepted 'fact' that exists by itself, the claim must be presented to an audience. Researchers do so when they present their results at a conference, in a scientific publication, or a newspaper article, for instance. When others start to respond to, refer to, and reproduce the new knowledge claim, the new entity starts to function independently from those who put it forward. The authors then need to move out and allow the new entity to survive on its own, within a community of people who use, and reproduce the knowledge construct. Once a knowledge construct is used to make new knowledge claims, it can be said it has become a 'fact'(Hacking 1983). The process of attaining representation is thus not an act of a single actor, but a social, interactive and collective process.

Blackboxing

When a knowledge claim becomes accepted, the work and complexity that went into its development starts to disappear from view and eventually becomes invisible. The observations, measurements, people, discussions, considerations, interests and circumstances that played a role in its development are put into a 'black box' and are, at least temporarily, hidden behind the singly entity that represents it (e.g. AIDS). The new entity that is constructed allows others to build upon what was learned, without having to open the black box. Blackboxing (and the simultaneous reduction of complexity) makes it possible to construct the complex layers of knowledge, which are shared within scientific disciplines, health practitioners and in other professional and lay communities.

Knowledge reservoirs and epistemic communities

While new knowledge may be taken up immediately by its producers, its use is often indirect. New knowledge is generally added to a knowledge reservoir, from which others may pick it up and use it (van der Meulen and Rip 2000; Rip 2001). There are various and overlapping knowledge reservoirs. Researchers tend to publish their results in scientific journals, which are important carriers of scientific knowledge reservoirs. Other professional and lay communities form and maintain their own knowledge reservoirs. Such knowledge reservoirs can have an explicit and formal component with carefully written texts. Knowledge reservoirs also have a more diffuse and informal component, which is embodied in people, artefacts, standards, practices, culture and structures. These reservoirs are maintained and reproduced in different ways, such as education, storytelling, human interaction, storage of texts, standardization of practices and mass production of artefacts.

A key feature of knowledge reservoirs is that local experiences are translated into knowledge constructs with a format, language and status that can more easily travel, so called cosmopolitan knowledge. This cosmopolitan knowledge can potentially be used by anyone, as long as they have sufficient access to the reservoir and the competences and capacity for utilization (Callon and Bowker 1994).

Knowledge reservoirs are developed and maintained by groups of people and social institutions. These groups can be referred to as epistemic communities (Haas 1992). Haas describes epistemic communities as groups of people who have a common interest in knowledge about a certain domain and have organized activities for developing, maintaining and improving knowledge reservoirs. Some examples of epistemic communities are professional communities of scientists or medical specialist, or the transdisciplinary network of people with expertise about HIV/AIDS. Epistemic communities can also cross boundaries between science, policy and practice—e.g. public health experts working in these different contexts.

Different epistemic communities have different aims, norms and practices, which shape how they produce and validate knowledge and maintain and improve their knowledge reservoirs. To function effectively, an epistemic community needs at least some partial agreement about a shared set of basic assumptions, concepts and broader theories, which support the production and validation of knowledge. In addition, epistemic communities have a relatively shared set of normative beliefs, about the practices and problems that are of concern, the framing of relevant issues and the people and institutions that should determine what is right and relevant. An epistemic community requires ongoing interaction and a relevant infrastructure and are often maintained through meetings, education programs, visits to share practices and codification of measures and protocols. Together, the shared epistemic and normative assumptions, the interaction and the communicative infrastructure provide the rails on which the knowledge practices of the community functions.

Closure in the search for knowledge

STS scholars have analyzed in detail how the search to reduce uncertainty and develop knowledge about a specific issue ends, and at least temporarily, some *closure* is achieved (Collins 1992; Rip 1986). These analyses show that closure is not a logical step, but a de-facto outcome of ongoing processes. Available knowledge becomes accepted because it is necessary to act, an issue is no longer a priority, funding for further research is lacking or the opponent in a controversy retires. Closure can also be sought explicitly. This happens especially when knowledge is to be acted upon, in deciding on a policy or intervention or formulating a new study proposal, for instance. Which knowledge counts and whether it is accepted as solid enough does not just depend on the reliability of the knowledge claims, but also on the aims, norms, practices and authority of those involved and the specific situation.

The pragmatist process perspective thus recognizes that the acceptance of a knowledge claim does not just depend on the specific observations or experiences upon which it is based, but also on the extent to which these can be aligned with aims, practices, theoretical considerations, cultural and moral values, interests and circumstances. Recognizing that the production of knowledge has a social component, does not have to lead to a relativist notion of 'truth'. While social processes shape the production of knowledge, the observations, measurements and experiences upon which knowledge is built, the way these are collected and aggregated and the process of inference still play an important role in producing knowledge that *works* in concrete practices.

The robustness of a knowledge construct is not just the result of an inherent quality of knowledge claim, but depends on the network of observations, arguments, interpretations, perceptions, interests, dominant values and circumstances that is constructed (Rip 1986). As Rip shows (1986)

This eventually creates a repertoire of considerations which are difficult to go against and in that sense, a knowledge construct can be robust.

Knowledge to Action as a double translation process

So far, I focused on how knowledge claims are produced, become accepted and at least temporary, some closure is achieved. STS scholars characterize the production of knowledge as a translation process, in which local experiences and observations are transformed into statements and other kinds of inscriptions, that have some validity at other times and places. This translation from something local to something generic has a social and a cognitive component. In the next section I focus on the use of knowledge, which involves another translation, back from the generic to the locally specific.

Making knowledge generalizable

The process perspective leads to a richer understanding of how the generalizability of knowledge is achieved. Instead of assuming that, based upon induction from a number of cases, a knowledge claim can be constructed that is inherently generalizable, the process perspective emphasizes the continues work, interaction and infrastructure that is required to make knowledge valid and applicable at other times and places. The validity or applicability of knowledge is thus not an intrinsic feature of a specific knowledge claim, but the result of the localization and realization of instances that are sufficiently similar to the situation in which knowledge was produced.

The translation of research findings to a local situation is easier if the context in which results are taken up resembles the context of knowledge production. Knowledge about the effects of a treatment that was tested in selected patients under controlled circumstances, says something about similar patients in similar circumstances.

To *make* this knowledge valid and applicable later or elsewhere, local situations have to be transformed into something resembling the research conditions. A claim about the effectiveness of a specific medicine becomes valid when doctors prescribe it to carefully diagnosed patients, who obtain it and use it according to protocol, just as in the controlled research circumstances in which it was shown to be effective. The local situation is thus transformed to *make* it similar to the situation in which knowledge about effectiveness was produced. The outside world thus has to be adjusted, disciplined and *made* generalizable to *make* knowledge valid and applicable at other times and places.

The process of adjusting and disciplining the world to make knowledge from controlled research circumstances valid and applicable at other times and places requires other knowledge that is not part of the original knowledge claim, such as knowledge about the specific local circumstances, and about how the complex world works and can be transformed. Since there are always other knowledge and skills required to make knowledge valid and applicable later or elsewhere, it is impossible to construct fully packaged and transferable knowledge products. Even a scientific article provides at best only a part of the 'story' of a trial or experiment and special competences and some embedding in a relevant community are required to unpack and understand it (Callon and Bowker 1994).

The spread of knowledge is thus not a unidirectional process in which the dynamics go from a source through its elaboration to eventual uptake and ultimately 'impact'. It is a dynamic and ongoing process in which knowledge is constantly co-produced. Because knowledge is embedded in larger processes and constantly evolving, STS scholars have argued that the spread of knowledge should not be characterized as a diffusion process, as the notion of 'diffusion' suggests the movement of something which itself remains unchanged. Instead, the spread of knowledge can better be seen as the result of an accumulation of translations, in which knowledge both has some stability and constantly evolves (Latour 1987b). The diffusion of knowledge can still take place, but should be seen as an exceptional case of translation, in which at new times and places, the same knowledge construct is produced.

Modes of knowledge production

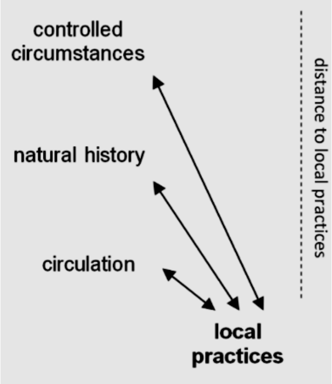
Based upon the above insights, STS scholars have introduced a typology of three different modes (or types) of knowledge production, that each have their advantages and disadvantages (Rip 2002). These three different modes of knowledge production differ in their distance to local practices and the challenge in translating the results back to these local practices.

The first mode is 'circulation', which refers to the production of experience-based knowledge that is gained by acting, observing and reflecting in daily practices. This experience-based knowledge remains close to the given local practices, but is limited in its scope to what was available in terms of circulations and observation 'in the wild'.

At some more distance from daily practices, there is the 'natural history' mode of knowledge production, which involves a dedicated search for specific observations, samples and specimens at carefully selected times and places.

At the greatest distance to local practices, there is knowledge production in controlled circumstances, such as experiments in a lab. In controlled experimental circumstances, one can produce knowledge that is internally robust, but constrained by these circumstances. There is thus a trade-off: as the circumstance are more controlled, the validity of knowledge produced in controlled circumstances can be substantiated better, but its scope remains limited because the complexity of the world about which knowledge is produced is reduced to the controlled circumstances.

***Figure 2**. different modes of knowledge production (inspired by Rip 2002)*



A final aspect of knowledge, that is relevant for this thesis, is that it is *underdetermined*. Philosophers of science have argued that while knowledge can have a certain degree of solidity, it will always be *underdetermined*. The *underdetermined* nature of knowledge means that there is never an absolute guarantee that later findings and/or new arguments will not undermine accepted insights (Sismondo 2010). The nature of knowledge production, and the precarious shift from specific findings into more general knowledge claims always leaves openings for doubts and further checks that can deconstruct the knowledge claim. As I have shown above, closure of the quest is a practical matter, not a logical step.

An important reason for this underdetermined character is that knowledge always depends on specific circumstances. From a logical perspective, this dependence undermines any attempt at universal validity. While one may try to control and reproduce the circumstances in which knowledge is produced, it is impossible to control for what is not known. It is therefore never certain if the circumstances later or elsewhere are sufficiently similar.

While controlling the circumstances in which knowledge is produced helps to substantiate knowledge, it also brings along additional limitations. Experiments in controlled circumstances provide insight into the world of those controlled circumstances, but not necessarily about what happens in the wider world (Krohn and Weyer 1994). When society is taken as the laboratory, it is impossible to do fully controlled experiments. As the philosopher Ian Hacking has phrased it: experimental science is lab science, and can tell us a lot about the lab world. The complexities of the world outside the lab may well be outside its reach (Hacking 1983).

The process perspective that I have sketched in the previous section provides an alternative to the KtA myths. The process perspective shows how, based upon a limited number of local experiences and observations, and experiments of a limited scope, a knowledge construct can be constructed that has some validity at other times and places. Knowledge is not an external 'objective' product, but part of continuous processes and ongoing work that is required to make knowledge generalizable, and valid and applicable at other times and places. Knowledge does not exist either in a world of its own or in individual minds, but is an aspect of participation in concrete practices. Cognition and knowing are distributed over both individuals and their environments and 'learning' is located in these relations and networks of distributed activities of participation.

Reinterpreting the functioning of the EB movement

The insights into the dynamics of KtA processes, which I combined into the process perspective, offer some building blocks for the next steps of this thesis. Before formulating the specific aim of this thesis, it is interesting to first look again at the linear Evidence Based approach.

The process perspective implies that the success of the Evidence Based movement cannot be understood simply by pointing to the inherent quality of the knowledge produced. The Evidence Based movement required the realization of an entire system for producing, assessing, transferring and using its version of knowledge (Bal 2017). Local practices, cultures and structures for knowledge production and application had to be transformed. Researchers, health professionals, policy makers and other stakeholders needed to be convinced that the practices of the Evidence Based movement and the knowledge it produced were superior. Researchers had to be trained, research methods standardized and funding flows shifted. Normative discussions about the assumptions that underpin research designs and the relevance of health outcomes had to be closed so that evidence could be presented as value free. Local contexts had to be adjusted to make evidence valid locally. Only when the entire system was constructed and the rails were carefully put in place could a linear Evidence Based approach work. The main challenge remained the use of the evidence. The need to translate generic evidence to the specific situation was sometimes acknowledged and supported, while deviating from the norm was also described as bad behavior (Cohen et al. 2008). The success stories of the linear Evidence Based approach were impressive, attractive and necessary for the movement to grow. Over time, the work that had been necessary to make effectiveness studies possible, to close normative discussions, to convince the people involved and to adapt contexts, fell into oblivion. What remained was the image of carefully produced evidence that was movable and had an inherent context-independent quality.

The disconnect between the narrative about the Evidence Based approach, and the way it actually worked, was not a problem as long as the system continued to be productive: new ideas and interventions became available, were carefully tested, users were able to translate the evidence provided to their specific situation and circumstances were reasonably stable. Problems and disappointments arose when the assumptions on which the approach relied, and the need to translate cosmopolitan knowledge into specific situations were ignored and the illusion arose that the effectiveness came from the delivered knowledge construct, rather than the locally realized configuration.

This description of the functioning of the (linear) Evidence Based movement supports the idea that the movement has overshot the mark and forgot its history (Berwick 2005). By reconnecting the movement with its history and the way in which it has been successful, we can identify ways to better utilize the strengths of a *linear EB approach*. Even more important is the insight that the linear EB approach is a far too limited approach that is only suitable for specific issues and as part of a far larger system of knowledge practices. These limitations of the *linear EB approach* and the dependence on a larger system of knowledge practices is widely recognized, but little attention has paid to bringing together and integrating insights into KtA and developing that larger approach. The empirically grounded insights that I have brought together and described provide ideas and building blocks for a more enlightened approach that preserves and supplements the strengths of existing approaches. Such a perspective could hopefully help to advance the way we learn and take on the increasingly dynamic, complex and deeply embedded health challenges of the 21st century.

Chapter 3

Analytical focus, methods and overview

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Aim and focus

In the introduction of this thesis, I laid out that, while research has contributed tremendously to improving health around the world, there are also many signs of problems and disappointments with the relevance, acceptance and use of research, and its contribution to action for health. In response to these problems and disappointments, numerous new insights and approaches have been developed, which aim to more effectively employ research to contribute to better health. These new approaches add important elements, but have also led to new questions and KtA challenges, and seem to have done little to reduce the problems and disappointments with KtA. A possible explanation for these problems and disappointments may be that these new approaches are implicitly or explicitly based upon a too simplistic perspective on how knowledge is produced, transferred and used to contribute to action for health.

In this thesis, I try to offer a more realistic and useful perspective that provides an alternative for the simplistic KtA myths. In chapter two, I laid out several empirically ground insights into the nature and dynamics of KtA which form the core of a pragmatist process perspective on KtA. I ended chapter two with a brief section in which I use this perspective to reinterpret the functioning of the Evidence Based movement.

In the next chapters, I will explore in different cases in different countries how the pragmatist process perspective can help to better analyze problems with KtA, and develop new and more productive approaches. The aim in this thesis is to explore how insights into producing, appraising, transferring and using knowledge, can be used to improve the contribution of knowledge practices to action for health. Besides using these insights to analyze these specific cases, I also try to contribute to constructing new insights and concrete methods, which are intended to help to increase the likelihood that investments in research and related knowledge practices contribute to improving health.

To guide the overarching cross-case analysis in this thesis, I have formulated five sub-questions:

1. To what extend are the KtA myths present in the concrete attempts to improve KtA practices and why?
2. To what extend does the pragmatist process perspective lead to a different characterization of the persistent problems with KtA in the health sector?
3. How can the translation of knowledge into action be characterized and mapped?
4. How do diverse actors and larger structures and dynamics in the context shape KtA processes?
5. What are some potential implications of the insights in this thesis for the further development of the Evidence Based movement, and the organization of knowledge practices for health.

Below, I offer a brief sketch of the structure of this thesis. In the subsequent method section, I lay out how the diverse case studies came into being and relate to each other. I end this chapter with a summary of the seven chapters that form the core of this thesis.

Structure of this thesis

In thesis, I present a set of empirical studies, which are situated in three different countries. In the first empirical case, which I describe in chapter four and five, I analyze an attempt to use an Evidence Based approach to improve the functioning of health promotion in the Netherlands. The core of this evidence-based improvement strategy consists of a system in which multi-disciplinary expert committees assess and rate the proven-effectiveness of 'interventions'. In chapter four, I analyze what, according to health promotion practitioners, an 'intervention that works' consists of, and how these 'interventions' can be moved from one time or place to the other. I then explore what the answers to these questions mean for the development, rating, transfer and use of interventions, and our understanding of the practices of the Evidence Based movement.

In chapter five, I analyze the way in which the quality of interventions is assessed and rated, and the contribution of the, so called, Effectiveness Rating System to improvement in practice. I focus on the diverse actors, practices and structures which are expected to play a role in the rating process and the overall improvement strategy of which it is part. I analyze not just how this specific version of a linear Evidence Based approach works out in practice, but also present a sketch of an alternative approach, named Responsive Guidance, which is designed to more effectively steer learning about interventions and improvement of the functioning of interventions in practice.

In chapter six, I present an analysis of the functioning of the health research system in Guinea Bissau, one of the poorest and least developed countries in the world. I use the National Health Research System (NHRS) approach and show how the development of the research system, the research that is being conducted, and its use, is shaped by a combination of local health issues, social, political and economic circumstances, the priorities of foreign donors and expatriate researchers, the local research capacities and the nature of the research findings. In addition, I show that the NHRS approach is too limited, because it does not take into account how research knowledge is translated into action and neglects the work and many actors that are involved in that process.

In chapter seven, I zoom in on the use of research. I show how, based upon a series of case studies, I have formulated a description of what the societal impact of research is and provide an empirically grounded characterization of the nature of this process. In chapter eight, I present Contribution Mapping, a method which I developed, together with others, to assess the use of research, with the aim of enhancing its impact. In chapter nine, I present an analysis of the relation between how research is organized and the extent to which results are used. For this analysis, I have studied 30 demand-driven research projects and mapped how they came into being, evolved over time and how results were translated into action. Based upon these case studies, I also further elaborate on how the process of translating results into action evolves, and is shaped by larger structures and dynamics in the context. In the final empirical chapter, I focus on the emergence and functioning of a program for demand-driven research which was located in Ghana, and supported by a North-South collaboration. I show through which efforts this program was developed and implemented, how those involved tried to orient research to national priorities in Ghana and facilitate locally embedded research, which remained dependent on a sponsorship constellation in the Netherlands.

Methods

In the different studies presented in this thesis, several methods are used. These methods are described in detail in each of the empirical chapters. In this introductory method section, I provide a brief sketch of how the different cases that were studied came into being and relate to each other.

Selection of case studies

This thesis did not start with a detailed plan with strict inclusion and exclusion criteria for selecting a set of case studies. Instead, I set out with a more general aim to conduct meaningful, demand-driven research of concrete efforts to improve the contribution of research (and related knowledge practices) to action for health. Since the use of research is clearly shaped by local circumstances, I sought to study these processes in diverse contexts. To increase the likelihood that the analyses would be used to contribute to local action, I wanted these studies to be demand-driven, and conduct them together with local researchers and other stakeholders.

The first two case studies, which I present in chapter 4 and 5, focus on an attempt to improve the functioning of health promotion in the Netherlands, by applying an Evidence Based approach to health promotion 'interventions'. In 2005, the Dutch Health Care Inspectorate (I provide the Dutch abbreviations: IGZ) published a report in which it stated that the quality of health promotion in the Netherlands was below expectations. In the report, the IGZ described that it was unclear what the effect was of the wide variety of health promotion interventions that were implemented by organizations such as the Municipality Health Services (GGD). To improve the performance of health promotion, the Ministry of Health asked the National Institute for Public Health and the Environment (RIVM) to set up the Center for Healthy Living (CGL). A core task of the CGL was to set up a system for assessing the effectiveness of health promotion interventions, the so called, Effectiveness Rating System (ERS).

To support the functioning of the ERS and the use of research into health promotion, the RIVM provided funding for a set of studies that aimed to better understand and improve the use of research evidence in the field of health promotion. While these studies were formally organized through the Vrije Universiteit Amsterdam, the research questions and study designs were developed together with researchers and others from the RIVM and CGL. A first study, which was formulated to inform the development of the rating system, focused on mapping the demand for, and actual use of, health promotion interventions. While the CGL focused on assessing 'interventions', it was unclear what these ‘interventions’ consisted of, and how they could be moved from one time or place to the other. We therefore explored what constituted an ‘intervention that works’ from the perspective of health promotion practitioners and how, according to them, the development and implementation of interventions should be improved. For this study, we formulated a multi-disciplinary research team and travelled to all GGD in the Netherlands to interview 81 health promotion practitioners.

The second study was designed together with representatives from CGL, Netherland Youth Institute (NJI) and Netherlands Center for Youth Health (NCJ), who were all involved in organizing the Effectiveness Rating System. The aim of this study was to explore the functioning of the ERS and the perspective of researchers, policy-makers and practitioners regarding its contribution to improvement. For this second study, we interviewed 53 selected key-informants from research, policy and practice in the Netherlands and observed the assessment of 12 interventions.

The second set of studies is linked to an ambitious attempt to develop a new and more effective strategy for organizing research in low-income countries. In the early nineties, analyses showed that conventional health research contributed little to health and development in low-income countries, because it was dominated by foreign scholars and was oriented towards international, rather than local research needs. After a difficult preparatory process, this led to a Ghanaian-Dutch research program, which was set up in Ghana. The program, which started in 2000, tried to increase the likelihood that research contributed to action by funding studies that were oriented towards national priorities and that were led by locally embedded researchers. In 2005, the designers of the program asked for an independent analysis of the impact of the funded studies, and the way this impact was related to the strategy of the research program.

To answer these questions, I initially tried to use existing methods for assessing the impact of research. During the first round of data collection, it became clear that the rich stories of interviewees and our focus on assessing processes did not fit well with the existing impact assessment methods. These methods were not based on a detailed perspective on how research-based knowledge was translated into action and neglected that active role of users and contexts. Together with Ghanaian and Dutch researchers, I have tried to develop a more realistic characterization of the ‘impact of research’ and the process of translating results into action. This characterization was used to further develop and refine the methods that we were using, which we named Contribution Mapping.

Using Contribution Mapping, we systematically examined how 30 studies evolved and how results were used to contribute to action. We combined interviews with 113 purposively selected key informants, document analysis and triangulation to map how research and translation processes evolved. In addition, I conducted a detailed case study of the historical development and functioning of this research program, for which we combined data from the 113 interviews with additional key-informant interviews, document analysis and observation of program events.

The third stream of data collection is linked to an attempt of the Ministry of Health in Guinea Bissau to develop and strengthen their national health research system. In 2008, I presented a first version of Contribution Mapping at the Ministerial Summit for Health Research in Bamako, Mali. After my presentation, I was approached by a representative of the Council for Health Research for Development (COHRED) and the Deputy Minister of Health of Guinea Bissau. They were interested in an independent analysis of the functioning of the research system in Guinea Bissau and an assessment of the impact of the local research. This analysis was meant as input for the design of a strategy for strengthening the national health research system. This strategy had three components: 1) developing a national research policy, 2) setting a national research agenda, and 3) setting up the new National Institute of Public Health (INASA). In Guinea Bissau, this process was supported by COHRED, with whom I closely collaborated. Data for his analysis were collected in Guinea Bissau during three stages in 2009-2011. We analyzed the emergence and functioning of the health research system and the use of the results of 12 research projects. We conducted 39 interviews with purposively selected key-informants, observed meetings and analyzed documents. In addition, interviews were conducted with participants at the London School of Hygiene & Tropical Medicine in the UK, the Staten Serum Institut in Copenhagen, Denmark, Instituto de Higiene e Medicina Tropica in Lissabon, Portugal and World Health Organization headquarters in Geneva, Switzerland.

Overview of the chapters

Chapter 4: Practitioner opinions on health promotion interventions that work: opening the black box of a linear Evidence Based approach

While attempts are being made to improve health promotion by following a linear Evidence-Based approach, the actors involved are aware that the quality of health promotion is not just a matter of supplying 'evidence-based' interventions to local practitioners, but the result of a situated coproduction process that depends on many factors. This chapter explores what constitutes an intervention that works from the perspective of health promotion professionals (HPP), and how, according to them, the development and implementation of interventions should be improved. We interviewed 81 HPPs about the use of 10 health promotion interventions at 30 Municipality Health Services in The Netherlands. The HPPs described an intervention that works as something that produces its intended effects after being realized in a local situation. Interventions are realized by combining elements of a supplied intervention (e.g. a theory, artefacts) with elements that are situated in the local context (e.g. funding, local network). Interventions that are transferred contain implicit assumptions about local contexts, but it is often unclear what precisely constitutes an intervention and what is assumed of local contexts. An intervention that works can be seen as a situated configuration of aligned elements. A linear Evidence Based approach depends on the realization of the local circumstances in which 'evidence based' interventions can work. Various strategies are possible for approximating such circumstances, but the core assumption that the configuration that is realized in practice is similar to the 'evidence based' intervention seems unrealistic for most health promotion in the Netherlands. Under such circumstances, attention should shift from central quality assurance to the system of actors and the distributed actions and heterogeneous learning processes that together add up to interventions that work.

Chapter 5: Improving health promotion: from hopeful ratings to Responsive Guidance

In various countries, attempts are made to improve health promotion through an evidence-based approach. Available evidence is used to centrally rate the quality of interventions, after which practitioners are encouraged to use these ratings. The Evidence Rating System (ERS) is an improvement-oriented approach in which expert committees assess submitted interventions and rate them as ‘theoretically sound’, ‘probably effective’ or ‘proven effective’. The aim of the study presented in this chapter is to explore the functioning of the ERS and the perspective of researchers, policymakers and practitioners regarding its contribution to improvement. For this study, we interviewed 53 selected key-informants from research, policy and practice in the Netherlands and observed the assessment of 12 interventions. Interviews revealed the assumption that the ERS contributes to two improvement dynamics: 1) the improvement of available interventions and 2) the improvement of health promotion in practice. While the describing and rating of interventions promotes learning and enhances the transferability of the interventions, the ERS seems too limited to effectively steer and stimulate these two improvement dynamics. The ERS is dominated by a scientific regime with a modernistic perspective on effectiveness. Of the 94 submitted interventions, only three were recognized as 'proven effective', one of which is considered impracticable by practitioners. While the expert committees struggle with a lack of norms for relevant effects and questions about how effects are best studied and rated, the ERS fails to encourage the improvement of aspects – like applicability and costs – deemed important by policymakers and practitioners. It neglects the local adaptation of interventions, and stakeholders worry that the lack of proven effectiveness will legitimize cutbacks rather than advance health promotion.

To better contribute to improving health promotion, a more inclusive and responsive 'guidance' approach seems required; one which stimulates improvement of different intervention aspects and is more explicit about the meaning of the recommendations provided.

Chapter 6: The emergence and current performance of a Health Research System: lessons from Guinea Bissau

Little is known about how health research systems (HRS) in low-income countries (LIC) emerge and evolve over time, and how this process relates to their performance. Understanding how HRSs emerge is important for the development of well-functioning National Health Research Systems (NHRS) in LIC. We studied how the HRS in Guinea Bissau has emerged and evolved over time and how the present system functions. We used a qualitative case-study methodology to explore the emergence and current performance of the HRS, using a NHRS framework. We reviewed documents and carried out 39 in-depth interviews, ranging from health research to policy and practice stakeholders. The research practices in Guinea Bissau led to the emergence of a HRS with both local and international links and strong dependencies on international partners and donors. The post-colonial, volatile and resource-dependent context, changes in donor policies, training of local researchers and nature of the research findings influenced how the HRS evolved. Research priorities have mostly been set by 'expatriate' researchers and focused on understanding and reducing child mortality. Research funding is almost exclusively provided by foreign donors and international agencies. The training of Guinean researchers started in the mid-nineties and has since reinforced the links with the health system, broadened the research agenda and enhanced local use of research. While some studies had a large international impact, the use of research findings within Guinea Bissau has been constrained by the weak and donor dependent health system, volatile government, top-down policies of international agencies, and the controversial nature of research findings. If the aim of research is to contribute to action through local decision making, it is essential to set national research priorities, align funding to local needs, build research capacity and link research to decision making processes. Donors and international agencies can contribute to this process by coordinating their efforts and aligning to national priorities.

Chapter 7: Examining the societal impact of research

To more effectively employ research for health, it is essential to evaluate its impact. The aim of the study presented in this chapter was to construct an empirically based operationalization of the societal impact of research that is useful for research monitoring and evaluation. An iterative, case study based approach was followed in which 22 purposively selected key informants were interviewed to map how six research and translation processes in Ghana and Guinea Bissau evolved. The empirical analyses showed that the societal impact of research depends on the agency of multiple actors and the evolving circumstances in which they are embedded, and cannot be attributed to a research project as point-source. Instead of trying to measure and attribute the 'impacts' of research, it is more realistic to map the 'contributions to action' that are realized. The contribution of research to action for health must be seen as a precarious and ongoing process in which knowledge plays a meaningful role in action for health. To realize a contribution to action, actors put forward a –more or less explicit– future story in which knowledge plays a role and then try to realize that actor-scenario. For analytical purposes, a useful distinction can be made between 1) contributions through the research activities, 2) contributions to knowledge and research, 3) contributions to action through linked-utilization and 4) contributions to action through utilization at-a-distance. Specific criteria were developed for 'what counts as' a contribution to action. After applying these criteria, a contribution to action was identified in five of the six assessed research projects. The empirical explorations illustrate that the developed operationalization, contribution categories and criteria are useful for evaluating research use and for learning how to better employ research for health.

Chapter 8: Contribution Mapping: a method for mapping the contribution of research to enhance its impact

At a time of growing emphasis on both the use of research and accountability, it is important for research funders, researchers and other stakeholders to monitor and evaluate the extent to which research contributes to better action for health, and find ways to enhance the likelihood that beneficial contributions are realized. Past attempts to assess research 'impact' struggle with operationalizing 'impact', identifying the users of research and attributing impact to research projects as source. In this chapter we describe *Contribution Mapping,* a novel approach to research monitoring and evaluation that aims to assess contributions instead of impacts. The approach focuses on processes and actors and systematically assesses anticipatory efforts that aim to enhance contributions, so-called *alignment efforts*. The approach is designed to be useful for both accountability purposes and for assisting in better employing research to contribute to action for health.

Contribution Mapping is inspired by a perspective from social studies of science on how research and knowledge utilization processes evolve. For each research project that is assessed, a three-phase process map is developed that includes the main actors, activities and *alignment efforts* during research formulation, production and knowledge extension (e.g. dissemination and utilization). The approach focuses on the actors involved in, or interacting with, a research project (the *linked actors*) and the most likely influential users, who are referred to as potential *key users*. In the first stage, the investigators of the assessed project are interviewed to develop a preliminary version of the process map and first estimation of research-related contributions. In the second stage, potential *key-users* and other informants are interviewed to trace, explore and triangulate possible contributions. In the third stage, the presence and role of *alignment efforts* is analyzed and the preliminary results are shared with relevant stakeholders for feedback and validation. After inconsistencies are clarified or described, the results are shared with stakeholders for learning, improvement and accountability purposes. *Contribution Mapping* provides an interesting alternative to existing methods that aim to assess research impact. The method is expected to be useful for research monitoring, single cases studies, comparing multiple cases and indicating how research can better be employed to contribute to better action for health.

Chapter 9: Which research gets used and why? an empirical analysis of 30 cases in Ghana

While health research is considered essential for improving health worldwide, it remains unclear how research is best organized to contribute to health, especially in lower-income countries. The study presented in this chapter examines a research program in Ghana that aimed to increase the likelihood that research would be used by fostering studies that were targeted towards national priorities and led by local researchers. The aim of this study was to map the contribution of this research to action and examine which features of research and translation processes were associated with the use of the results.

Using contribution mapping, we systematically examined how 30 studies evolved and how results were used to contribute to action. We combined interviews with 113 purposively selected key informants, document analysis and triangulation to map how research and translation processes evolved and contributions to action were realized. After each case was analysed separately, a cross-case analysis was conducted to identify patterns in the association between features of research processes and the use of research.

The results of 20 of the 30 studies were used to contribute to action within 12 months. The priority setting and proposal selection process led to the funding of studies which were from the outset closely aligned with health sector priorities. Research was most likely to be used when it was initiated and conducted by people who were in a position to use their results in their own work. The results of 17 out of 18 of these user initiated studies were translated into action. Other features of research that appeared to contribute to its use were involving potential key users in formulating proposals and developing recommendations.

Our study underlines the importance of supporting research that meets locally-expressed needs, and that is led by people embedded in the contexts in which results can be used. Supporting the involvement of health sector professionals in the design, conduct and interpretation of research appears to be an especially worthwhile investment.

Chapter 10: Towards effective North-South collaboration: realizing a program for demand-driven and locally led research

At the turn of the nineties, studies showed that health research contributed little to health and development in low and middle-income countries because it was oriented towards international priorities and dominated by researchers from the North. A new approach to North-South collaboration was required, that would support demand-driven and locally led research in the South. The aim of the study presented in this chapter was to analyse the development and functioning of a program for demand-driven and locally led research in Ghana that was supported by a North-South collaboration.

For this mixed-method case-study, we combined document analysis, key-informant interviews and observation of program events. The development of the research program started with constructing a sponsorship constellation in the Netherlands. After showing the problems with traditional research collaboration, an advisory council formulated a vision for a more equal and effective approach to North-South collaboration. Together with Ghanaian partners, this vision was turned into a proposal for a Ghanaian-led program for demand-driven and locally led research, which was funded by the Netherlands government. Research priority setting showed that the Ghanaian research needs were very different from the priorities of foreign funders and researchers. After a slow start, the number of locally submitted proposals increased from 13 in 2001 up to 94 in 2005, revealing a substantial, but partly latent reservoir of research capacity. In total, 79 studies were funded. An impact evaluation showed that results were often used to contribute to action. Despite its success, the research program came to an end in 2008 after the sponsorship constellation in the Netherlands fell apart and attempts to mobilize funding in Ghana did not succeed. Our study shows that realizing a program for demand-driven and locally led research in the South provides an effective approach to North-South collaboration in which results are used and local capacities and institutions are strengthened.

Chapter 11: General discussion

In the general discussion, I return to the questions I formulated in the introduction. First, I briefly discuss the extent to which the KtA myths were present in the KtA approaches that I have analyzed in the Netherlands, Guinea Bissau and Ghana. I will then discuss some explanations for the persistence of these KtA myths and their implications for the use of the process perspective.

In the second part, I explore the added value of the process perspective. I discuss how the insights into the nature and dynamics of KtA processes shed new light on four much-discussed problems with KtA: 1) disappointments and problems with the use of research, 2) combining knowledge from research with knowledge from other sources, 3) the trade-off between the substantiation and the applicability of knowledge; and 4) the limitations of central quality assurance.

In the third part, I discuss key insights and lessons that arise from the empirical chapters and their implications for both understanding KtA processes and for attempts to improve their functioning and productiveness. I start this third part with the explicit characterization of the translation of knowledge into action, and its implications for understanding and improving the use of knowledge. Next, I discuss the search for a balance between locally specific and more generically oriented knowledge production. I continue with discussing the various actors and communities that play a role in KtA and the way in which KtA is influenced by larger structures and dynamics in the context. I then discuss the importance of a reflexive and responsive approach, in which organized KtA processes are monitored and adapted with the aim to improve their productivity. Finally, I explore some possible implications of the insights in this thesis for the further development of the Evidence Based movement, and the organization of knowledge practices and learning processes for health.

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Chapter 4

Practitioner opinions on health promotion interventions that work: opening the 'black box' of a linear Evidence-Based approach

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Practitioner opinions on health promotion interventions that work: opening the 'black box' of a linear Evidence-Based approach

Introduction

During the past decade, attempts to improve health promotion have embraced a linear Evidence-Based (EB) approach (Brug et al. 2010; Cohen et al. 2008; Estabrooks and Glasgow 2006; Green and Glasgow 2006; Kelly et al. 2010). The essence of a linear EB approach is to first determine the effectiveness of interventions and consequently promote their use in practice. We have added the term *linear* to emphasize that this approach is only one of the possible approaches to the use of evidence in practice. A *linear* approach assumes, implicitly, that interventions are fixed entities that can be moved around while staying the same, and depicts the design and research of interventions at-a-distance as the point source of the improvement of local practice (Kline and Rosenberg 1986). Proponents of a linear EB approach describe deviating from this fixed, predetermined entity as less effective and bad practice. In clinical care a linear EB approach appears successful, but attempts to apply it to public health and health promotion have led to a range of problems and challenges, both with determining the effectiveness of interventions and with the use of ‘evidence-based’ interventions in practice (Baranowski 2006; Green and Glasgow 2006; Kelly et al. 2010; Rychetnik 2004). The Center for Healthy Living (Dutch acronym: CGL), which was established in 2008 in the Netherlands, is an interesting example of an attempt to improve health promotion by embracing a linear EB approach (Brug et al. 2010). One of the core tasks of the CGL has been to develop and manage a central (national level) quality assurance structure that recognizes interventions based upon their proven effectiveness. Those involved in the quality assurance structure have emphasized since its inception that to achieve successful health promotion, it is not enough to just supply ‘effective’ interventions to local practitioners. Interventions that work are realized in practice by health promotion professionals (HPP) who combine elements of a supplied intervention with elements that are situated in the local context (e.g. network of intermediaries, funding, competences of HPPs) (Estabrooks and Glasgow 2006; Green et al. 2009; Kelly et al. 2010). The actions (e.g. designing, learning by testing and doing) that lead to an intervention that works are thus distributed among different actors and the intervention that is ultimately realized in practice is a situated co-production. These insights raise questions that are important for the central quality assurance that lies at the core of a linear EB approach. What actually constitutes the configuration that we refer to as ‘intervention’? How does the ‘intervention’ that is designed and researched at-a-distance, and centrally recognized as effective, relate to what is later supplied to practitioners and to what is ultimately realized in local practice? The answers to these questions are essential for organizations like the CGL that are charged with the task of developing a central quality assurance structure (Abraham et al. 2009; Brug et al. 2010; Dubois et al. 2008; Kelly et al. 2009). This central quality assurance is not a goal in itself, but part of a strategy aimed at contributing to improvement in local practice. A good understanding of what is going on in local practice is essential in finding the best approach to quality assurance and improvement. Though much has been written about how effective interventions should be developed, much less is known about the perspective of HPPs who attempt to make interventions work in practice. The perspective of HPPs is important because they play a key role in making interventions work. The aim of this study is to explore what constitutes an intervention that works from the perspective of HPPs, and how, according to them, the development and implementation of interventions should be improved. We explored these questions from a pragmatic perspective. These issues have a much wider currency than health promotion in the Netherlands. The idea of improving public goods and services, such as health and social services, through central structures for quality assurance has international interest (Berwick 2005; Kelly et al. 2010). Lessons about how such an approach functions and can be optimized are relevant to all those charged with taking forward an ‘evidence-based’ improvement agenda.

Center for Healthy Living in the health promotion system

The health promotion system in the Netherlands consists of organizations at national and local level. The Public Health Act of 2008 assigns the primary responsibility of executing collective prevention to the municipal governments. Collective prevention should encompass: creating insight into the health status of the population, drafting a local health policy strategy (every 4 years), safeguarding health aspects in policy decisions and contributing to setting up, executing and coordinating prevention programs, including health promotion. By law, every municipality is required to contract the Municipal Health Service (MHS) in their region. Since the decentralization in 2004, the municipalities have full policy freedom in determining the priorities, resource allocation and precise organization of health promotion. There are great differences between the 30 MHSs with respect to the set priorities, the way health promotion is organized, the funding received, the collaboration with local and national organizations and the health promotion activities conducted. This diversity is exemplified by the large difference in the available capacity for health promotion per MHS and the number of citizens for which a MHS works (see Figure 1). The number of citizens per HPP varies among MHSs from 22,000 to 380,000.

At the national level, the Ministry of Health (MoH) sets broad national priorities and provides task-specific funding for 10 Health Promotion Theme Institutes (TI) that work for specific themes, such as consumer safety, tobacco control and HIV/AIDS prevention. The Health Care Inspectorate (IGZ) promotes public health through the inspection and enforcement of the quality of prevention measures. In the past, IGZ has reported that health promotion in the Netherlands functioned below expectations. At the request of the MoH, the CGL was therefore set up to support health promotion in the Netherlands. One of the core tasks of the CGL has been to develop and manage a quality assurance structure that independently determines which of the developed and supplied interventions are the most 'effective' (Brug et al., 2010). The CGL promotes the use of these recognized interventions instead of locally created or other interventions. The IGZ biannually inspects the MHSs and has stated that it will determine the quality of their functioning by assessing the extent to which interventions that are recognized as 'effective' by the CGL are implemented.

Figure 1. The diversity in the fte for health promotion per capita

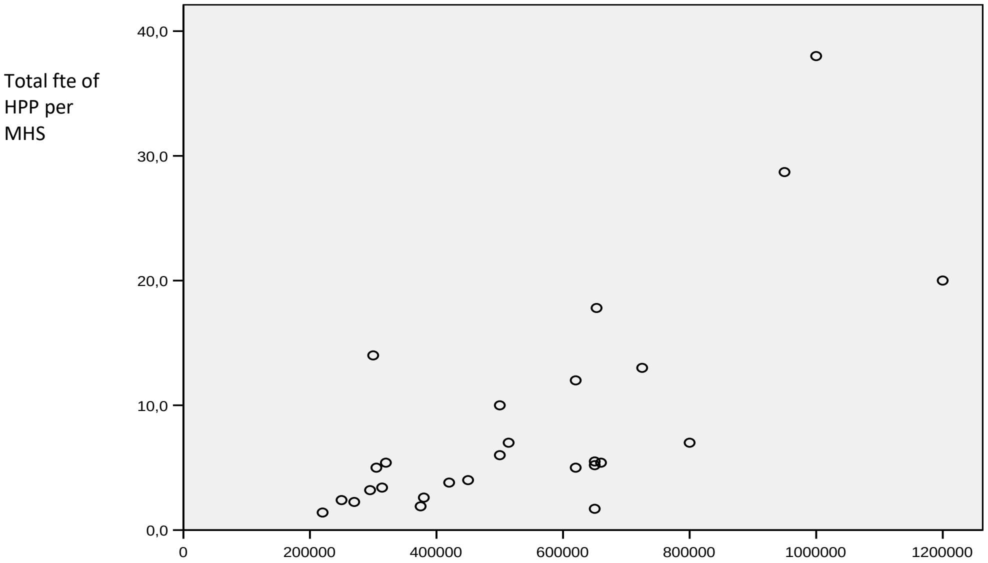


Figure1: the diversity in the capacity (in fte) for health promotion per capita

Table 1. The ten Theme Institutes and the suggested interventions

Theme Institute	**The interventions**
NIGZ The Netherlands Institute for Health Promotion supports professionals and organisations in the development and implementation of health promotion.	**Go for healthy!** An agenda setting annual national campaign for primary schools (5-12 y). The aims are to put health and safety promotion on the agenda of schools, be an umbrella for health promotion programmes and stimulate the introduction of the health promoting method. Go for healthy! starts with a test for children, teachers and their parents after which schools can use their own, or provided materials, and downloadable lessons to promote health. Schools are assisted in finding organizations that can support them.
Pharos A knowledge centre that assists professionals and organisations that want to improve the provision of (health) care and services for refugees, asylum seekers and (undocumented) migrants.	**Wiser in Love** Handbook for providing sexual education to asylum seekers and migrants. Comprises of a 9 lesson curriculum for sexual education for youthful asylum seekers and migrants that can be used in asylum seekers centres, and at schools for asylum seekers. Themes vary from introduction to sexuality, sexual development, diversity, prostitution and lover boys, STI's, birth control, friendship and relations and female circumcision.
NISB The Netherlands Institute for Sport and Physical Activity implements and assesses activities and supports governments and (sports) organisations to encourage physical activity and improve coordination.	**Communities on the Move** A community-based intervention method, oriented towards inactive citizens with a low SES. The method aims to assist professionals to employ participation and empowerment as strategies for bottom up health promotion and aims to achieve intersectoral collaboration and structural embedding. The aim is that participants are structurally physically active by being more active in daily life and by knowing more about a healthy and active lifestyle.
Rutgers Nisso Group Dutch Expert Centre on Sexuality, dedicated to promoting sexual and reproductive health.	**Spring Fever Week** A 5 lesson curriculum programme with age specific lessons for 5-12 year olds in which, during an annually organized week, a daily lesson is provided at primary schools about relational and sexual development. Nationally organized activities aim to raise awareness in the designated week. The lessons can also be employable at other times during the year.
Schorer stichting Institute for homosexuality, health and well-being. Offers lesbians, gay men, bisexuals and transgenders information, knowledge and facilities to improve their health and well-being.	**Keep it safe** A package of modules for facilitators and organizers of youth groups with instructions, information, methods and materials for organizing and having meetings about sexual health, safe sex, STI's and HIV. In addition to the package, advice and support is offered.
STI AIDS Netherlands National institute for STI and AIDS Control aims to prevent sexually transmitted infections including AIDS and improve the quality of STI control in the Netherlands.	**'Long live love'** Comprises of 6 lessons aimed at helping high school students learn to talk and negotiate about relations and safe sex, using condoms and anti-conception. It is accompanied with an information brochure, a handbook for teachers and a video with 5 lessons. It is especially meant for multicultural, preparatory vocational school students and teachers.
Consumer and Safety Foundation Dutch foundation that aims to increase safety for citizens by reducing injuries that are caused by accidents by providing information and prevention efforts.	**Stop, you are falling!** A method to prevent falling, aim at intermediary parties. There are various handbooks (homecare, elderly care, local government and for municipality health authorities) to assist local organizations with organizing and executing fall prevention activities. Workshops are organized for exchanging experiences and tips for implementing of fall prevention activities and tips for recruiting colleagues and collaboration partners keeping them enthusiastic.
Stivoro Dutch foundation for a smoke free future that aims to promote health of smokers and non-smokers by developing an applying knowledge about tobacco use and addiction.	**24-hour-not smoking-action** A multi method campaign that challenges smokers to stop smoking for 24 hours. Participants can share their experiences online and receive personalized feedback about the information of non-smoking, tips and advice to become a non-smoker. Municipality health services promote the campaign at the local level by spreading flyers and posters while at a national level campaign comprises of radio, outdoor and online advertisement.
Trimbos Institute Seeks to enhance quality of life by engaging in the development and application of knowledge about mental health, addiction and associated physical illnesses.	**The healthy school and stimulants** A multi component prevention programme about alcohol, smoking and drugs. It comprises of: educational lessons, engaging parents, setting rules for stimulants, and signalling and supporting students who show (problematic) use of stimulants. Schools can receive support for the programme from a MHS or local addiction treatment centre.
The Nutrition Centre Provides scientifically founded information about healthy and safe food and food quality and encourages consumers to eat healthily and safely.	The '**Healthy School Canteen**' project aims to promote healthy food products in school canteens by introducing hygiene standards, offering advice about healthy choices, addressing students' choices in the canteen and introducing school policies. The campaign is directed at all types of schools and concerns teachers, students, canteen employees and parents. The educational part focuses specifically on the age 12-16.

Methods

Study population

For this study, we conducted interviews and read research reports and policy documents of the CGL, the RIVM and the MoH related to health promotion in the Netherlands. Between May 2008 and June 2009, all 30 MHSs in the Netherlands were approached for voluntary interviews with the professionals involved in health promotion (two merging MHSs were counted as one).

Interview guide development and the interviewing process

Inspired by work of others, we developed a semi-structured interview guide (Estabrooks and Glasgow 2006). A draft version was designed and discussed in a working group at CGL with staff from a variety of local and national organizations related to health promotion. Each of the ten TIs was asked to suggest one of their most used interventions (see Table 1, right column).

The interviews started with mostly closed questions concerning the basic characteristics of the MHS and open questions about the views of the HPPs on how health promotion, the process of developing and implementing interventions and the collaboration between the actors involved could be improved. This was followed by asking the HPPs open questions about what, in their opinion, for them constituted an intervention that works. We encouraged HPPs to elaborate on this and give examples. The interviews continued with a discussion of the various processes around each TI intervention (e.g. contacts with TI, supply, adoption, adaptation, implementation, learning, support). We explored how the collaboration between national and local organizations around interventions could be improved, and which health themes and target groups required more or less attention. The interviews concluded with cross-cutting questions that addressed particular themes or hypotheses that emerged from the earlier interviews.

Data analysis

The research reports and policy documents were read and used to describe the formal structure and role of the CGL in the health promotion system. A detailed summary of each interview was prepared by one of the interviewers and a data management assistant using both the audio-tapes and notes taken during the interviews. The detailed summaries were organized according to question and TI intervention. Three of the four interviewers and a data management assistant were involved in data analyses. Data were analyzed manually by coding statements from the interviews according to topic and by counting categorical responses where possible. This was first done separately by the researchers involved, after which the coding was discussed. Summaries were made for each topic and each TI intervention by going through the summarized interviews and identifying themes using a constant comparative method of analysis (Pope, Ziebland, and Mays 2000). Theme and TI intervention specific summaries were then developed (Braun and Clarke 2006).

Results

At all 30 MHSs, one or more HPPs agreed to be interviewed, resulting in a total of 81 interviewed HPPs. Two of the interviews could not be recorded and were therefore excluded as data for this study.

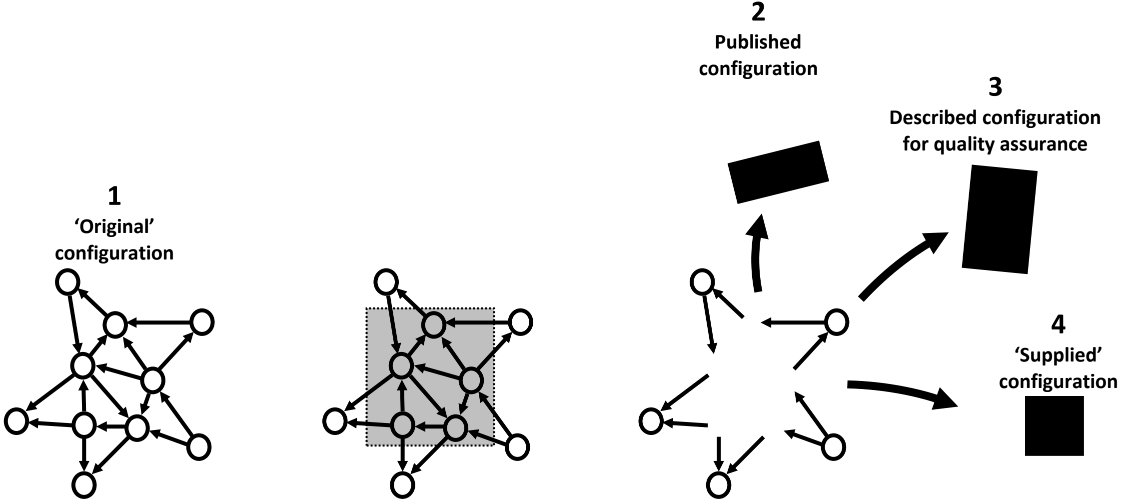
This results section starts with the descriptions of HPPs of 'an intervention that works', the elements that comprise such interventions, the vague boundaries between an intervention and its context and the role of research. This is followed by the perspective of the HPPs on how the development and implementation of interventions in practice could be improved.

An intervention that works according to health promotion professionals

The HPPs generally described an 'intervention that works' as something that produces its intended effects after being realized in the local situation. When asked to be more specific, the HPPs started to describe the different elements (e.g. theory, funding, leadership, intermediaries, artifacts, competences) that comprise an intervention. The HPPs emphasized the importance of the process in which elements are combined, adapted and aligned into a configuration that is locally situated and works in practice. In their descriptions, the HPPs alternated between describing an intervention as a fixed 'black box' and describing it as a flexible, situated configuration of aligned elements. Analysis of the descriptions revealed that the HPPs referred to five different 'versions' (see Fig. 2) of an intervention: 1) the 'original' configuration realized by the developers in a selected situation, 2) the configuration described in scientific publications, which is a reduction of the original complexities, 3) the configuration described for the CGL recognition committee, 4) the configuration supplied to the MHSs (containing elements such as a handbook, training, an explicit theory, additional funding, etc), and 5) the intervention realized in a local situation (which differs between locations).

The HPPs described a large variation in the extent to which supplied interventions were more or less completed. Some interventions comprised only a handbook and expected only that the HPPs send these to relevant teachers. Other interventions were predicated on the involvement of community members in the design and implementation of the intervention and required a much more active role of HPPs. The majority of HPPs preferred intervention designs that anticipated local adaptation and co-production (e.g. a 'method' with ready-made artifacts or an intervention consisting of finalized modules, such as a handbook with a number of separate lessons).

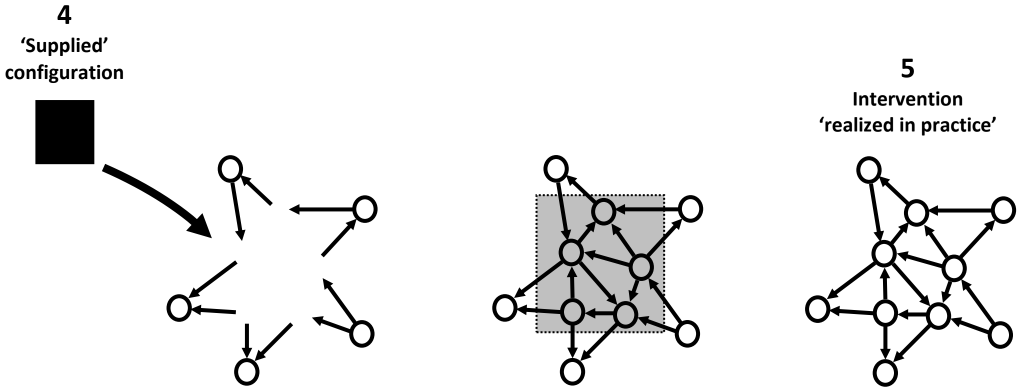
Figure 2. Five versions of an intervention



1. An 'original' version of an intervention is developed by aligning elements into a configuration that hopefully works in practice. This 'original' version is researched.

2. An intervention is made transferable by decontextualizing it. A boundary is drawn through the original configuration. A part is turned into a transferrable 'intervention', and the other elements become 'context'.

3. For different purposes (e.g. publication, quality assurance, transfer to practice), different versions of the original configuration are made. Each version (reduction) has its own selection of elements and assumptions of contexts. The boundary between intervention and context is not necessarily clear.



4. A linear EB approach assumes that local complexities are transformed to resemble the context in which the original intervention worked. A selection of the original configuration is then supplied to this 'context'.

5. To realize the original configuration, the 'supplied intervention' is aligned with the context.

6. A linear EB model assumes that the 'original' configuration is then recreated. In reality such a perfect 'diffusion' is unrealistic. The configuration that is realized is best understood as a 'translation' and will contain smaller or larger changes.

Vague boundaries between intervention and context

The HPPs found it difficult to precisely demarcate the boundary between an intervention and its context. For some interventions specific skills and funding were part of the supplied intervention, while other interventions assumed that this existed in the local context. The vagueness of this *boundary* was problematic when an intervention is passed on from one organization to the other, and the tasks and responsibilities for intervention elements are determined (e.g. who is responsible for the funding, competences, etc).

We attempted to make a distinction between the 'core elements', that were mostly described as part of the supplied intervention, and 'proximal elements', that were mostly assumed to exist in the local context.

Core elements

As the core of an intervention, the HPPs described its **theory** or action plan and the **artifacts** which comprise it. *"The essence of an intervention is the logic behind it, a good theory is essential"* (HPP1). These theories were often not explicit, which made it more difficult to adapt interventions to the local context. Interventions could consist of all kinds of artifacts, including posters, letters to schools and gadgets. The HPPs preferred artifacts that were as finalized as possible, but still somehow adaptable. *"A ready-made poster is useful, but in general adapting [artifacts] to the local situation remains crucial"* (HPP2). Various adaptations of artifacts were described, such as adding the logo and address of an MHS to prints or adapting the language and pictures to make them more appropriate for the target population. **Information** about an intervention was also considered part of it. Examples include information about the target population, the resources required (time and funding), the theory, the best implementation method, research findings and the outcomes that can be expected. Such information is important when choosing to adopt an intervention, and when realizing it in local practice.

Proximal elements

The HPPs described that interventions contain assumptions about the contexts in which they are to be realized. The most explicitly described and problematic assumptions relate to the existence of specific **competences** and available **funding** at the MHS and characteristics of the **target population**. Interventions assume that HPPs have a range of competencies such as being able to negotiate with local policy makers and engaging intermediaries in health promotion. For some interventions, training for specific skills and competences is provided. *"It was good to do the Master class that is part of Springfever Week (intervention). It gave insight into its functioning and helped when we were talking with teachers"* (HPP3). Most interventions assume that funding for staff and intervention-specific activities is locally available. *"Each intervention we are supposed to carry out requires manpower. We cannot carry out all interventions, at all schools"* (HPP4). For some interventions additional funding is provided by the TI: "*They provide a set amount to employ some temporary staff as part of that intervention. It really works well"* (HPP6).

HPPs described how interventions contain assumptions about the target populations for which they are supposed to be used. HPPs often emphasized that the populations they work for are very different from those for which interventions are designed. *"A lot of interventions are too white, and are aimed at target groups that are well educated. We deal with youth who have more diverse backgrounds and lower SES"* (HPP2).

The HPPs also described a **planning**, **local network**, **stewardship role** and **supportive local government** as important for realizing an intervention that works. These elements were mostly described as part of the context, but still essential in realizing a working configuration. Planning is necessary for the functioning of an MHS, and specifically required for interventions that are carried out in combination with a national media campaign during a specific week of the year. *"We draw up an annual planning well in advance in which an intervention needs to be given a place"* (HPP7). Interventions assume that an MHS has a local network to reach a target population. Such a local network can be both generic and intervention-specific. *"Interventions fail without our contacts with schools, and knowing what's going on at the schools"* (HPP8). The HPPs often expressed that in a few months' time too many different interventions were supposed to be implemented at schools.

In some interventions, the local stewardship role of the MHS was an explicit element, while other interventions implicitly assumed that the MHS had such a role. To make interventions work in practice, a supportive local government that prioritizes the theme of an intervention is important. The HPPs described how enthusiastic civil servants were instrumental in realizing an intervention that works. "*He asked us what he could do, got the local press involved and even spoke with some schools"* (HPP6). For issues such as fall prevention and reducing tobacco use, there was little interest from the municipalities who considered these issues for the national government. "*It's not on their agenda and that makes it not easy to work on that issue"* (HPP9).

Improving the development and implementation of interventions

We asked the HPPs what should be done to improve the development, supply and implementation of interventions. To structure the interviews, we assumed a development and implementation 'path' with four phases: 1) intervention design and development, 2) supply and adoption, 3) adaptation and realization, 4) monitoring and ownership.

Intervention design and development

Most HPPs described that it was the task of the TIs to develop interventions and their own task to implement them. Because the interventions supplied by the TIs often did not fit their needs, they also had to develop their own interventions. There was a broad consensus that too many new interventions were being developed instead of there being a focus on improving and upgrading the existing interventions. "*Tell them to please stop developing new interventions"* (HPP10). The HPPs wanted to be involved in intervention development as advisors in a project group, implementers of a pilot intervention and as development partners. Furthermore, it was suggested that during intervention development there should be more focus on the differences between the contexts and target groups for which the MHSs work (small rural villages, larger cities, high or low SES, different religious backgrounds).

The fact that each TI works for a specific health promotion theme (e.g. smoking, nutrition, physical activity) resulted in both overlap (three TIs deal with sexually transmittable diseases) and a lack of integration of health themes in interventions. The lack of integration was most evident with respect to obesity, for which too many ad hoc interventions were developed, instead of integrated 'programs' that combined nutrition and exercise. Alcohol use among adults and elderly and prevention of depression at collective level also needed more attention. More targeted interventions were needed for groups of lower SES, elderly and migrants. The HPPs described the lack of coordination between TIs and the funding of intervention development through short-term project subsidies as the most important reason for the lack of alignment and harmonization between interventions.

Supply and adoption

The HPPs were asked why they chose certain interventions and not others, and how they preferred to be supplied with interventions. The HPPs explained that they chose interventions based on whether these suited their needs and priorities and whether they trusted the TI that supplied it.

"*Personal contact is important; it helps when you know someone when you call them on the phone.*" (HPP11)

Interventions not used were those that seemed too large to use in practice, those for which there was little information available, those that the HPPs did not have the time to implement or those whose theme was not a local priority. The HPPs found it difficult to determine whether the supplied interventions were effective. *"It has been studied by universities, so I assume it's effective"* (HPP6). The opinion of the HPPs towards effectiveness research showed a remarkable duality: they widely considered it important for the effectiveness of interventions to be thoroughly studied, but at the same time emphasized that the interventions they realized in practice were very different from the configurations that were researched. When we pointed out this contradiction, the HPPs insisted on the importance of research, but for other reasons. "*We should continue research because it legitimizes what we do and helps establish health promotion as a profession.*" (HPP12)

The HPPs wanted more information about the effects of interventions. They wanted to know through which mechanism(s) an intervention works, which elements are essential and why, and what is expected of the local context. "*Give us a fact-sheet on constraints, effective elements and on how to adapt it*" (HPP13). MHSs wanted better information about costs, time investment and experiences with interventions. This should be available in short fact-sheets, preferably with a link to background research. *"We must know what the costs are, how much time we must invest in it"* (HPP14). Such information could help in negotiations with municipalities.

The HPPs preferred interventions supplied to them as comprehensive packages of effective modules that were as complete as possible, but still adaptable. Ideally, interventions contain a 'core' module that should always be used, and a variety of other modules that could be employed for specific settings and target groups. The MHSs with a limited capacity for health promotion generally preferred interventions that are completed as much as possible, while the larger MHSs mostly preferred interventions that assumed local co-construction.

Adapting and realizing interventions in practice

The HPPs described their core task as promoting health by realizing interventions in practice. The most challenging aspects of realizing interventions are recruiting intermediaries, like schools, and down-scaling supplied interventions, while ensuring their effectiveness and determining the effects of interventions. The HPPs described how they are able to recruit only a minority of the schools or other intermediaries with whom an intervention is to be carried out. The limited budget that is allocated for health promotion is seen as the major constraint in implementing interventions. "*We* *have hundreds of schools in our region and it is not possible to visit all of them and monitor the implementation of Healthy Schools."* (HPP15)

The most described adaptation is making an intervention smaller and less intensive. Schools are often willing to carry out only one or a few of the lessons, while interventions often contain 10 or more. It remains unclear to the HPPs whether their adapted versions of interventions are still effective. *"We honestly don't know."* (HPP16)

The HPPs explained that they are often hindered in their local stewardship role by other organizations that directly approach intermediaries (e.g. sport clubs, schools) without consulting them. *"They send them beautiful books about how to stop smoking, and the next week someone else approaches them about another (health) theme, all without informing us. Schools just ignore it and throw it away. How are we supposed to coordinate health promotion?"* (HPP11).

Ownership and monitoring

The HPPs stressed that for each intervention an organization, such as a TI, should fulfill an 'ownership' role. The 'owner' should supply the intervention artifacts (e.g. leaflets, posters, gadgets, DVDs), provide training, conduct research and collect lessons about an intervention and continue to improve it. When interventions are developed by academic institutes, the ownership role could be assigned to a TI. The process of intervening and the effects of interventions in the local context are seldom monitored. The HPPs considered monitoring important, but felt constrained by a lack of time, infrastructure and experience.

Improvements proposed by HPPs

The HPPs suggested that the development and implementation of interventions, and joint learning throughout these processes, could be improved by: 1) better anticipating the conditions in which an intervention has to work, 2) describing the elements that comprise an intervention that works, 3) clearly assigning responsibilities for elements and ownership roles for interventions, 4) coordinating activities between actors involved at local and national level (e.g. division of tasks, planning), 5) supporting and respecting the roles of organizations, and 6) gathering valuable lessons from a variety of learning processes (e.g. experience, monitoring, and implementation and effectiveness research) (see Box 1).

Box 1.Improvements proposed by health promotion professionals

1. Encourage developers to better anticipate the conditions in which an intervention has to work
The anticipation of the conditions in which an intervention has to work could be improved by involving HPPs and others in those aspects of intervention development to which they can contribute with their knowledge and skills. The development of new interventions should be demand-driven and take into account the variety of contexts in which the MHSs work. Instead of a stream of separate project-based interventions the HPPs would prefer to work with comprehensive and mutually aligned programs that consist of intervention modules.

2. Describe in detail the elements that constitute an intervention that works
For each intervention, information should be provided about the elements that comprise it and the assumptions about the context in which an intervention is to be applied (e.g. costs, local organization, leadership role, time, staff competences, theory).

3. Assign responsibilities and ownership roles for interventions and their elements
The description of intervention elements makes it possible to assign the responsibility for elements to the organizations that collaborate around interventions (who is responsible for what?). After an intervention has been developed, an organization should fulfill an ownership role which includes: collecting lessons about its realization, regularly updating and supplying materials and continuing development based upon insights from research and experience.

4. Coordinate activities between involved organizations at local and national level
A national organization like the CGL should coordinate activities between organizations by means of a centrally shared agenda in which important activities around interventions are announced (e.g. developing new interventions, supplying material, implementation).

5. Supporting and respecting the stewardship roles of local organizations
Local organizations like the MHSs play a crucial role in coordinating and networking for interventions at the local level. National organizations need to take these organizations into account in their activities and respect and support their local roles.

6. Gather lessons from various kinds of learning processes
A central organization should collect and integrate lessons gained from various kinds of learning such as experience, monitoring and implementation and effectiveness research. Questions from practice should guide the search for new knowledge about specific interventions and more general intervention mechanisms.

Discussion

The results indicate that HPPs consider an intervention that works a configuration of aligned elements that produces its intended effects after being realized in the local situation. The emphasis on the wider range of elements that has to be aligned (e.g. the local government, target group, school teachers, financial support) is interesting, because it helps one understand the circumstances in which a linear EB approach can work, its underlying assumptions and its inherent limitations. A linear EB approach starts with designing interventions and determining their effectiveness. What is often ignored is that the effect of an entire configuration is studied, instead of just a programme theory or a package of prevention lessons. Effects are subsequently attributed to only some of the elements (e.g. programme theory), instead of to the entire configuration (e.g. supportive local government, enthusiastic teachers, established local network). Successes in clinical care suggest that such reductionism and the emphasis on transferring and implementing fixed entities that comes with a linear EB approach can be productive. Our findings provide six reasons why attempts to apply a linear EB approach to health promotion may be less productive: 1) it is unclear what precisely constitutes an intervention, 2) it is unclear what an 'effective' intervention assumes of local contexts, 3) health promotion takes place in highly diverse and open settings, 4) health promotion organizations are very diverse and the system is not well developed, 5) it is impossible to realize similar configurations in different locations, and 6) it is difficult to determine if an intervention works in practice as intended.

The strategic role that the HPPs assign to research differs from the instrumental role that proponents of a linear EB approach tend to emphasize. The HPPs are in favor of effectiveness research to increase the legitimacy of their profession. In addition, effectiveness claims may help them secure funding and convince local stakeholders. At the same time, the HPPs stressed that the interventions they realize in practice differ substantially from the configurations to which the effectiveness claims apply. This strategic role of research is well known, but has not been described in health promotion. These findings support those who seek ways to more productively employ research to contribute to the improvement of health promotion (Brownson and Jones 2009; Green et al. 2009).

The suggestions for improvement made by the HPPs contain four strategies for making a linear EB approach work: 1) adding more complexity (e.g. elements and their interactions) to intervention research and descriptions, 2) transforming intervention contexts to make them more similar, 3) better anticipating intervention contexts during their design, and 4) providing coordination for those actions that are distributed between involved organizations.

Adding more complexity to intervention research and descriptions can help those involved better understand what an 'effective' configuration actually entails. This is important for transferring interventions, for dividing and assigning responsibilities for intervention elements to the actors involved and for realizing 'interventions that work' in new situations. Research that takes more complexity into account is also proposed by the Realist evaluation movement (Douglas, Gray, and van Teijlingen 2010; Jansen et al. 2006; Pawson and Tilley 1997). An important process is the demarcation (or decontextualization) of an intervention from its context. To make an intervention transferable, a part of the configuration is selected to become the 'intervention' and the other parts become 'context'. This process is important because the selection made determines what is expected from the context in which an intervention is supposed to function. Despite its importance, this process is poorly understood and seems based on traditions and circumstances instead of on anticipating the situations in which an intervention has to work. The practitioners, researchers, and policy makers involved tend to blame disappointing results on each other when intervention boundaries and assumptions about local contexts remain vague. Better descriptions of what works for whom, in what context could stimulate mutual learning and more productive collaboration around interventions.

The HPPs suggested that the homogeneity of local contexts needs to be increased in order for a linear EB approach to work. The linear EB approach has its origins in clinical care in which interventions are often clearly defined (e.g. a surgical procedure) and contexts have been made very homogeneous (down to controlling the air flow in operation theaters). Health promotion contexts can be made somewhat more homogeneous by enhancing local capacities, strengthening organizations and providing more resources, but it seems unrealistic to expect major changes in intervention contexts like local schools and suburbs.

The necessity for transforming local contexts can decreases when those who design interventions at-a-distance better anticipate the situations in which interventions have to be realized. Some strategies to achieve this include engaging local communities and HPPs in the design of interventions, developing smaller interventions and testing them in more 'natural' practice settings through more pragmatic trials (Ayi et al. 2010; Chung et al. 2007; Thorpe et al. 2009).

While there are thus various strategies for approximating the circumstances in which a more linear EB approach can work, the results indicate that the interventions that are realized in practice will never be identical in different real-life settings and never exact copies of the original configuration to which effectiveness claims apply. What is realized in practice will always be a situated co-production that is deeply embedded in a complex social context. Whether the intervention that is realized in practice is the most appropriate, cannot be determined by just comparing it to an original configuration. Appropriateness (or effectiveness) is not independent from context: it depends on the specific situation. This limits the extent to which the design and research of interventions in one situation can be the point-source of improvement for other situations, and supports those who challenge the idea that 'fidelity to a preset protocol' is the most important determinant of success (Cohen et al. 2008). Problems can emerge when the strict implementation of 'evidence-based' interventions is enforced. There is no guarantee that 'evidence-based' interventions are the best possible configurations in the specific circumstances and an assertive push may hamper the local dynamics that are needed to realize the most appropriate intervention.

While this study provides a new perspective on health promotion interventions, it also has certain limitations. Our findings may be influenced by the selection of interventions. All ten interventions are relatively standardized and predefined. This may have increased the likelihood that a linear EB approach seems to work. Such an approach is less likely to work for interventions that more explicitly assume co-production through community engagement and local ownership. Secondly, a more ideal study would combine interviews with observations of how HPPs acquire and realize interventions in practice. This kind of ethnographic approach would require much more time and resources. The strengths of our study include the large sample of practitioners and settings and its practical relevance.

Ultimately, what is important is what happens in local practice, as this is where the interventions that contribute to health are realized and situated. The key consideration is not centrally determining effectiveness, but joint learning and how this can lead to improved practices for health. Knowledge from heterogeneous sources and a variety of learning processes are needed. Learning is already happening in practice, and the challenge is to add to this with organized learning such as research and monitoring. Improvement efforts should be oriented towards the most promising range of distributed actions that lead to the realization of interventions that work in practice.

Organizations like the CGL can encourage the actors involved to focus on what happens locally and at the same time ensure that the actions that can be conducted at-a-distance actually contribute to local practice. An example would be to facilitate interaction between HPPs and TI's, and encourage the latter to develop smaller and more easily implemented interventions. The challenge is to find the right balance between what needs to be locally designed, learned and realized, and what the design and learning at-a-distance can add to this. There is no blueprint for how these actions should be distributed and organized, as this depends on the particular situation and goals of actors. The general rule is that the less local complexity can be predicted and controlled, the less a linear EB approach can be relied on, and the more depends on the local capacities to design and realize interventions and learn during that process. The most productive approach depends on the particular situation and has to be found by evaluating productiveness in practice. Organizations like CGL can try to monitor who is doing what, evaluate outcomes, stimulate learning and the exchange of knowledge and provide coordination in the collective search for improving health.

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Chapter 5

Improving health promotion through central rating of interventions: the need for responsive guidance

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Improving health promotion through central rating of interventions: the need for responsive guidance

Introduction

More and more, countries are putting systems in place for assessing the quality of health promotion interventions, with the ultimate aim of contributing to better health promotion (Brug et al. 2010; Judd, Frankish, and Moulton 2001; Kelly et al. 2010; Kliche et al. 2011; Ng and De Colombani 2015). The idea of encouraging and steering improvement through central quality rating is inspired by the success stories of the evidenced-based movement (Faggiano et al. 2014; Greenhalgh and Russell 2009). In a traditional evidence-based approach, the available evidence for the effectiveness of interventions is centrally rated, after which local users are encouraged to implement the most effective interventions (Ng and De Colombani 2015). In such an approach, interventions are viewed as transferable packages and quality is operationalized as the proven effectiveness of an intervention. An evidence-based approach can provide important benefits (Brady, Canavan, and Redmond 2016). Central rating of the effectiveness of interventions by experts can help health workers, policymakers and others benefit from intervention development, research and appraisal work that has been carried out elsewhere and enhance the efficiency, effectiveness and legitimacy of health promotion (Faggiano et al. 2014; Ng and De Colombani 2015). It can create an arena for the articulation of standards and the sharing and integration of knowledge and may thereby facilitate learning in the health promotion system (Harder et al. 2015).

While an evidence-based approach to health promotion seems promising and may yield substantial benefits, attempts to apply an evidence-based approach to life-style related health promotion have faced many challenges (Ng and De Colombani 2015). Healthy behaviour depends on many factors that are deeply intertwined in a complex social context, which makes it difficult to assess and attribute effects to interventions, decontextualize them and reproduce similar 'effective' interventions elsewhere (Kok et al. 2012; Nutbeam 1998; Willis et al. 2016). In addition to this intertwinement and multi-causality, it may take a long time before related changes in health are achieved, which further complicates the challenge of assessing effects and determining their relevance (Green et al. 2006; Kelly et al. 2010; Wang, Moss, and Hiller 2006). The promise of an evidence-based approach and the encountered challenges have fuelled a search for better ways of employing central rating of effectiveness in health promotion (Judd et al. 2001; Kelly et al. 2009; Kliche et al. 2011). An interesting attempt to apply the ideas of the evidence-based movement to health promotion is the Effectiveness Rating System (ERS) (in Dutch: Erkenningssysteem). Since 2008, the ERS has been applied to lifestyle related health promotion interventions in the Netherlands by the Centre for Healthy Living (in Dutch Centrum Gezond Leven) and partners (Brug et al. 2010). One of the core tasks of the Centre for Healthy Living is to assess the quality of available – previously developed – health promotion interventions. In the ERS approach, intervention developers are requested to describe an available intervention according to a standardized format and submit it for rating. These interventions are then assessed by an ERS committee, consisting of health promotion research and practice experts. Local health promoting professionals are subsequently encouraged to use the interventions that have received the highest rating level. The potential benefits and reported challenges of applying an evidence-based approach to health promotion call for an analysis of how the ERS works in practice and the extent to which it actually contributes to improvement of health promotion.

In order to gain a better understanding of how the ERS works in practice, and to contribute to its optimization, it is essential to take into account the ways in which existing structures, the parties involved and procedures are embedded in larger regimes and systems. The central rating of the quality of interventions is not a goal in itself, but part of a strategy for improving health promotion in practice. In the ERS and this broader improvement strategy, a variety of actors (e.g. researchers, policymakers and health promotion practitioners) play a role (Brug et al. 2010). These diverse professionals function within their own regimes such as science, politics and local health promotion, with their own incentives and accountability criteria (Wehrens, Bekker, and Bal 2011). Policymakers must take into account legitimacy and social acceptability. Researchers are held accountable for their publications and health promotion practitioners are concerned with the feasibility and effects of health promotional activities in their specific local context [12]. The involvement of and reliance on actors from differing regimes has consequences for the ERS. The diverse professionals that are involved must be able to fulfil their function in the ERS, while simultaneously functioning in their own regime where the ERS may also fulfil a function for them. A good understanding of this interdependency is essential for those responsible for managing and optimizing the ERS. Although a lot has been written about evidence-based health promotion, much less is known about this interdependency and the eventual contribution of central quality rating to the improvement of health promotion.

The aim of this study is to explore the actual functioning of the ERS and the perspectives of researchers, policymakers and practitioners regarding its contribution to improvement in practice. We explored these questions from a pragmatist perspective and followed a case study design.

The Effectiveness Rating System

After several years of preparation, the Centre for Healthy Living was established in 2008 at the request of the Ministry of Health at the National Institute for Public Health and the Environment (Dutch acronym: RIVM). One of the core tasks of the Centre for Healthy Living was to develop and manage the Effectiveness Rating System (which is also known as the Recognition system and described in detail elsewhere) (Brug et al. 2010). In the Effectiveness Rating System, developers of life-style oriented health promotion interventions are invited to describe their interventions according to a standard format and submit these for rating. Two committees (one for youth and one for adults) consisting of experts from science and local practice are charged with assessing the submitted interventions. Interventions can be recognized on three incremental levels of the so-called effectiveness ladder: 1) theoretically sound, 2) probably effective and 3) proven effective (Brady et al. 2016; Brug et al. 2010).

Rating of 'theoretically sound' requires that the targets, strategy, preconditions and the process through which the intervention is supposed to impact health are described and reference is made to an established health behaviour change theory. The second level of 'probably effective' involves the additional requirement that the effectiveness be demonstrated in at least one methodologically strong study in the Netherlands, or three studies with lower validity. The highest level 'proven effective' requires two methodologically strong Dutch studies, or one strong Dutch study combined with two strong foreign studies.

Methods

Study design and study population

This in-depth case study was part of a larger evaluation of the functioning of the ERS and its contribution to improving health promotion in practice, that was jointly developed by university based researchers and the National Institute for Public Health and the Environment (RIVM) in the Netherlands. Data for this case study were collected by means of conducting semi-structured interviews and observing the assessment of 12 interventions in two different ERS committee meetings.

For a first series of interviews, we purposively sampled 15 of the 30 Municipality Health Services in the Netherlands based on size and geographical representation. Professionals involved in health promotion at these Municipality Health Service were approached for voluntary interviews. A second series of interviews was held with 17 purposively selected key-informants who were professionally related to, or involved in, the Effectiveness Rating System. The aim was to sample influential stakeholders with a broad range of roles related to the ERS (e.g. committee members, members of advisory councils) in research (e.g. leading scientists in health promotion, research funding organizations), policy (e.g. in municipalities) and practice (e.g. health promotion practitioners). Participants were approached by telephone and by email. All people who were approached for this study agreed to participate.

Interview guide development and the interviewing process

The topic list for the interviews was developed in two steps. A first topic list was developed in close consultation with Centre of Healthy Living staff and piloted in two interviews. After piloting, the order of the topics was changed and a final topic list was established. The topic list was flexible enough to be adapted to each type of interviewee (e.g. policymaker, researcher, health promotion practitioners) depending on their specific role and expertise.

The interviews commenced with basic questions about the participants employment background and an exploration of the participants relation to the ERS (e.g. involvement in submitting interventions, the committees, indirect involvement as research funder, policymaker). The interviews continued with open questions about the precise role of the interviewee in relation to the ERS and the role that the ERS potentially fulfils for the interviewee in his or her own regime. This was followed by exploring how participants expected the ERS to contribute to improvement in health promotion and their perspective on the functioning and specific problems of the ERS. The interviews concluded with cross-cutting questions that addressed particular themes or hypotheses that emerged from the earlier interviews. Interviews were held at the location where participants worked and lasted about an hour. The process of discussing and rating 12 interventions was observed and audio-recorded during two committee sessions.

An experienced university based interviewer (MK) was involved in all interviews and the observation at both rating committee meetings. A second experienced interviewer was involved in about half the interviews in order to prevent interviewer bias. Permission was asked for recording the interviews and the recordings were transcribed verbatim. One interviewee did not want to be recorded and in one interview the equipment failed. Notes were taken during these interviews and they were typed up in more detail immediately afterwards.

Data analysis

The observed committee meetings and all but two interviews were audio recorded and transcribed verbatim. After each interview and observation, a detailed summary was prepared by one of the interviewers, using the audio-tapes and notes taken during the interviews and observations. A data management assistant supported the researchers in transcribing the interviews and the recorded meetings and helped coding the data. MAXQDA was used to code the transcripts and notes. Some themes were identified in advance and others were derived from the data. After a first round of open coding, codes were checked independently by a second researcher, after which the coding and emerging themes were discussed. After a second round of coding, summaries were made for each topic by going through the detailed summaries of the interviews and observation notes and coded transcripts identifying themes using a constant comparative method of analysis (Pope, Ziebland, and Mays 2000). Theme specific summaries were then developed (Braun and Clarke 2006) .
This study did not require ethics approval according to current Dutch law. Verbal consent to participate in the interviews, record the interviews and use the results for publication was obtained from all participants. Care has been taken to ensure that no comments can be traced back to an individual.

Results

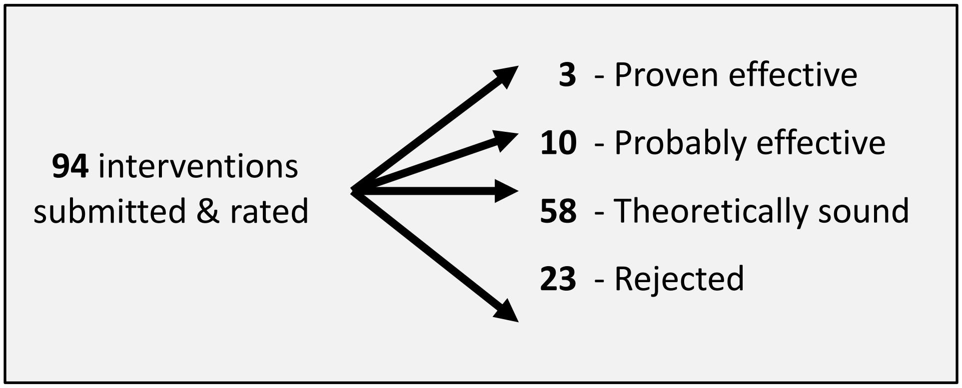
Description of sample

In total, 53 participants in the Netherlands were interviewed for this study between August 2009 and August 2012. The participants had various primary professional positions, as members of government organizations (e.g. Ministry of Health, municipalities) (n=7), researchers (n=6), employees of the research funder ZonMw (n=3) or health promotion practitioners in a Municipality Health Service (n=37). Some participants had multiple secondary positions, such as members (n=4) or chairs (n=2) of the observed Effectiveness Rating System committee, advisors to the Centre for Healthy Living (n=8), the Ministry of Health (n=9) or municipalities (n=28) and contributing to research (n=17) and intervention development (n=26).

Assessed interventions

Between their inception in 2008 and the end of 2012, the two ERS committees assessed a total of 94 interventions. Of the assessed interventions, 23 were rejected, 58 were rated as 'theoretically sound', ten were rated as 'probably effective' and three were recognized as 'proven effective' (see Figure 1).

Figure 1: Interventions submitted, assessed and rated



The roles of involved actors in the ERS

We asked participants which role the involved professionals were expected to play in the ERS committees and in the broader improvement strategy of which it is part. Several participants who worked as policy makers and health promotion practitioners pointed out that researchers and the scientific regime played a prominent role in the ERS. They said that the improvement strategy positioned effectiveness research as a necessary requirement for achieving better health promotion. Several health promotion practitioners pointed out that researchers played a key role in designing the tools and procedures of the rating system (e.g. the format for describing interventions, the criteria and rating levels). Furthermore, researchers chaired the ERS committees and many of the committee members were also researchers. Participants said that policymakers were expected to contribute to the ERS improvement strategy by encouraging professionals to submit interventions for rating and requesting health promotion practitioners to use rated interventions. The independent Healthcare

Inspectorate was expected to play a role by assessing the use of rated interventions in future inspections. Participants also pointed to the role of the research funding organization ZonMw, who required that recipients of funding had to submit interventions for rating. The final group of professionals that was expected to play a role in the ERS strategy were health promotion practitioners. Health promotion participants emphasized that, while they had limited influence in the ERS, a lot was expected from them. They were expected to be involved in effectiveness research, to describe and submit interventions for rating and to implement those interventions that receive the highest rating.

The role of the ERS for the actors involved

We asked participants which role the ERS was expected to fulfil for the different professionals that were involved in it. Health promotion practitioners and policy makers pointed out that the ERS approach seemed very useful for researchers, as the strategy required the investment of large amounts of effectiveness research. In addition, the ERS anchored the role of research in both determining the rating criteria and in applying these in assessing interventions. Participants explained that the ERS could be useful for policymakers as source of information and as a means of legitimizing decisions about health promotion. They further said that the overview of rated interventions allowed the research funder ZonMw to more easily target its investments in intervention research and development. Staff of the Healthcare Inspectorate said that the rating of interventions provided them with an instrument for examining the quality of health promotion. Researchers, policy makers and staff of the health care inspectorate expected that the ERS could help health promotion practitioners in selecting the most appropriate interventions. While most health promotion practitioners were sceptical towards the ERS ratings, they often said that it encouraged them to reflect on their work.

The role of the ERS in two improvement dynamics

We explored the perspective of participants on the aim of the ERS and the way it was intended to contribute to improving health promotion. Participants had different ideas about the roles of the ERS and used different terms to describe these roles. Some described its role simply as determining the effectiveness of interventions. Others described the ERS as an attempt to control local health promotion. The most often described roles were ‘stimulating of intervention improvement’ and ‘advising on intervention quality’ by providing an overview of available interventions and insight into the effectiveness and other characteristics of interventions. We asked participants to describe how, according to them, the ERS was intended to contribute to improving health promotion. Their responses showed that the ERS was intended to contribute to two separate, but related improvement dynamics: a first dynamic, leading to improvement of available interventions, and a second dynamic, leading to improvement of health promotion in local practice.

First role of the ERS identified by participants: stimulating the improvement of interventions

Participants consistently said that the ERS was intended to stimulate the improvement of available health promotion interventions. While participants generally agreed that the ERS led to some positive developments, most of them said that it faced too many limitations to effectively encourage and steer improvement of the reservoir of available interventions.

In the ERS, the first rating level requires that an intervention is thoroughly described. Participants often emphasized how important it was that the ERS encouraged the accurate and thorough description of interventions and explained that it promoted reflection, learning and improvement with respect to available interventions.

“When we wanted to submit the intervention, we were confronted with questions, things we hadn’t thought through well enough. What exactly was the theory that we applied? What evidence is available for that theory? You’re constructing and reconstructing that when you submit an intervention. You identify blind spots and have to fill those in. It is a way in which you certainly increase quality and improve substance. That’s the benefit. I can certainly see a learning effect.” (health promotion practitioner/policy advisor)

Some researchers were worried that rating would only result in better descriptions, rather than improving interventions.

“One of the things I am concerned about is that only the descriptions of interventions are improved. That isn’t what this is all about. We want them to improve the intervention itself. They think that when they describe it a little nicer, we will all of a sudden like their intervention.” (researcher/committee member)

Problems with effectiveness and the effectiveness ladder

The designers of the Effectiveness Ladder explained how the rating levels were meant to create a trajectory that stimulated improvement of available interventions. While participants supported the idea of using rating to stimulate intervention improvement, they questioned whether a hierarchy that focuses only on proven effectiveness was the most suitable approach. Participants argued that the stepwise rating on the effectiveness hierarchy was both too ambitious and too limited, and therefore unsuitable for guiding the process of intervention improvement. The most frequently expressed criticism was that highest level in the Effectiveness Rating System ('proven effective') was unattainable for most interventions in health promotion because the criteria were too demanding. Three specific issues related to effectiveness were raised: 1) shared norms for relevant effects were lacking, 2) there was uncertainty about how the effect of health promotion should be studied and 3) the Effectiveness Rating System was not suitable for complex intervention processes.

The lack of shared norms for relevant effects

A first issue that was raised was that norms or standards for relevant effects were lacking (e.g. what percentage of a target population should lose how much weight at what point in time before an anti-obesity intervention should be rated as effective?). The interviews and observations revealed that the absence of these norms were a constant source of questions and discussion when rating interventions. While participants considered effectiveness important, they found it difficult to describe which effects were minimally required before an intervention was recognized as 'effective'. For those not partaking in the ERS, it was unclear which standards or norms were used to determine which effects were relevant and how much 'effect' was required before an intervention was rated as 'effective'. When we asked participants to describe such standards or norms, they either refused or found it very difficult and pointed to other stakeholders to do so. The Healthcare Inspectorate argued that it was up to the 'field', while Health promotion practitioners mostly pointed to researchers and the rating committees, but also emphasized that citizen preferences should be taken into account. Committee members indicated that norms for the relevance of effects were seldom clear and were often constructed ad hoc while assessing an intervention.

"I find it a difficult process that is increasingly getting more complicated. So many factors play a role and the weighting method is not unambiguous. I sometimes think, now we find this one theoretically well founded and then that one goes further and not that other one, and how they differ, I do not know. The criteria are abstract. In such a committee meeting a kind of process emerges whereby a decision is ultimately made. Sometimes the balance tilts one way or the other, while I think, if it had been in a different context or with slightly different committee members around the table, it just might have tilted the other way and would be proven effective." (health promotion practitioner/committee member).

The difficulties resulting from a lack of norms for relevant effects became obvious during the observations of the rating committees. One intervention that did not have the expected effect size, but did show some slight effects, raised much discussion. In the approach of the ERS, intervention submitters had to set specific objectives, including relevant effects, before an intervention was studied. When research failed to demonstrate the anticipated effects, the rating committee decided it could not rate the intervention as 'probably effective'. However, some committee members were reluctant to dismiss the intervention because, even though the effects were smaller than anticipated, they could still be relevant. Finally, it was decided that in order to be eligible for rating, the intervention needed to be resubmitted with adjusted objectives, aiming for less ambitious effect sizes.

Uncertainty about how health promotion has effect

A second challenge was that there were continuous discussions and insufficient agreement about how health promotion interventions had effects and when and how such effects could be established. Several participants, especially researchers and health promotion practitioners, criticized the idea of, and focus on, separate interventions that should lead to linear, directly connected and easily demonstrable effects. The interviewed health promotion practitioners and researchers often emphasized that healthy behaviour is highly contextual and influenced by a large number of evolving factors. They argued that different health promotion activities together may affect health trends, but that such changes are not easily attributable to individual interventions. They suggested that more research is needed into how different components or mechanisms together lead to health and how research and monitoring can best be deployed to contribute to health promotion.

The ERS is not suitable for multi-component intervention processes

A third problem that was described was that the ERS was not suitable for multi-component intervention processes. Several participants argued that the ERS was only suitable for rather simple, well-defined interventions with a clear beginning and end point that were aiming at changing behaviour at the individual level. Health promotion practitioners and researchers argued that in lifestyle related health promotion, the most effects were expected from intervention programs that contained different integrated components and which were preferably co-created in practice. The strength of such interventions seemed to result from the joint working of components, the engagement of local actors and the responsiveness to local circumstances. Participants argued that the quality of such intervention processes depended not on the protocol, but on the way the process was run, the competencies and motivation of those involved and the learning throughout the intervention process. These intervention processes were not easily studied by simple before and after measurements and would be different when they were implemented at other times and places.

"The rating system is aimed at structured, orderly, sequential interventions, rather similar to what is common in the medical field, [...] while in health promotion we need to take into account changes in the environment that are less easily testable, so achieving 'proven effectiveness' for the interventions that are probably the most effective could be more difficult than it is for interventions that focus on one detail but will have less impact on population health."
(researcher/committee member)

In interviews with committee members and during the observed committee sessions, it was argued that the rating criteria had to be adapted according to the kind of intervention. Some suggested a more relative approach in which the most suitable study design was first determined and then the strength of evidence was discussed.

Other limitations of the ERS rating strategy

Besides the specific problems and challenges with effectiveness, participants described five other problems that were limiting the contribution of the ERS to the improvement of available interventions: 1) necessary learning processes were ignored, 2) improvement of applicability aspects was not encouraged, 3) a mechanism for continuous feedback and improvement was lacking, 4) integration of knowledge was not encouraged, and 5) the necessary research funding was lacking.

Necessary learning processes are ignored

Participants from different constituencies argued that the Effectiveness Ladder was too limited because it only encourages research into effectiveness, while other learning processes necessary for improving interventions were ignored. Health promotion practitioners and researchers said that more had to be learned about how interventions were adapted and realized in local practice, how intervention mechanisms worked in context, the costs and competencies required for interventions and the experiences of health promotion practitioners with interventions. Some researchers and health promotion practitioners argued for promoting a variety of organized learning processes (e.g. cost analysis, process monitoring) and the need to share these lessons through a central platform.

"We have learned a lot from monitoring and reflection with stakeholders during the intervention process. Those lessons should be compiled somewhere and shared and added to the intervention. [...] research should also say something about the elements of the intervention theory and about the working principles in it, and what is also needed is more emphasis on the contextual requirements and local applicability. So that means that you do need to set some additional requirements" (researcher/committee member)

Improvement of applicability aspects is not encouraged

Health promotion practitioners argued that the ERS did not encourage the actual improvement of applicability aspects of interventions, such as the costs, adaptability and context requirements. They pointed out that one of the three interventions that were recognized as 'proven effective' was never used because it seemed impossible to implement in practice. Some health promotion practitioners said that this illustrated that the Effectiveness Ladder was too limited to stimulate the required improvement of interventions. They argued for a system that should also stimulate making interventions cheaper, more flexible, less demanding and easier to implement.

"They are only talking about effectiveness, and then provide you with an impractical intervention that demands a lot from intermediaries and from us and costs a lot of money. We need something that is easily applicable and efficient and attractive for participants. That must be improved as well; effectiveness alone makes no sense." (health promotion practitioner)

A mechanism for continuous feedback and improvement is lacking

Participants who were closely involved with the ERS argued that the improvement of available interventions should be a continuous process. They described that, in the past, interventions were often developed by universities and disappeared after the project funding ran out. Participants were pleased that the ERS required that each intervention had an 'owner' who remained responsible for it. They argued that feedback from the rating process and from the implementation of interventions should be used to continue intervention improvement over time. They proposed an iterative approach to rating and financial incentives to stimulate continued improvement.

Integration of knowledge is not encouraged

Another concern that was raised by both researchers and health promotion practitioners was that the ERS did not encourage the integration of knowledge about health promotion. Moreover, some were worried that the focus on single interventions would actually lead to fragmentation of knowledge. Members of the rating committees said that they had the impression that they regularly assessed interventions that were substantively very similar. Some researchers argued that a classification system or taxonomy could be useful to prevent overlap, achieve efficiency and stimulate collective learning for health promotion. Such a classification or taxonomy of mechanisms would make it possible to compare interventions, integrate knowledge and prevent overlap and fragmentation. Participants pointed to taxonomies that were being developed and could possibly be used in the near future.

"We should not strive for evidence-based, but theory-based health promotion, and with this I mean really that you shouldn't be testing every small intervention in every singular context because then we will need ten times the budget and then we are spending it all on testing and not on implementing. You must identify overarching principles that appear to be effective in certain contexts." (Researcher/Committee member)

The required research funding is lacking

A final issue that participants raised was that only a fraction of the funding that was required for assessing the effectiveness of all submitted interventions was available. The ERS required two positive effect studies before an intervention could be rated as 'proven effective'. Researchers pointed out that they were unlikely to receive funding to investigate the effectiveness of an intervention for a second time. The research funder ZonMw stated that it could fund only a few effectiveness studies each year, while hundreds of studies were required for the ERS strategy.

"You already know from the beginning you are never ever going to achieve that level because you really don't have the resources to finance such research, so in itself I think the criteria are very scientifically correct, but it is almost impossible to arrive at that highest level" (employee of research funder ZonMw)

Some participants who were involved in the ERS committees wondered how many new studies were required when one of the earlier studies showed no effect, and asked how many negative studies were required before an intervention was formally recognized as 'proven not effective'. Participants generally agreed that the ERS strategy required a lot more research funding than what was available and worried that the number of interventions that could be rated as ‘proven effective’ would remain very limited in the years to come.

The second role of the ERS identified by participants: contributing to improving health promotion in local practice

The second dynamic to which the Effectiveness Rating System was intended to contribute was the improvement of health promotion in practice. Several participants said that, over time, the Effectiveness Rating System could contribute to better health promotion by making it easier for practitioners to select the most appropriate interventions. Some health promotion practitioners said that they expected that the more thorough descriptions of interventions would facilitate their transfer and improve their use. Most participants considered it likely that, in the long term, the improvement of the available interventions would also contribute to better health promotion in practice. Besides these hopeful expectations, participants pointed to three limitations of the Effectiveness Rating System that were hampering its contribution to better health promotion.

The impression that health promotion does not work

Several participants, especially health promotion practitioners and policy makers, were concerned that the Effectiveness Rating System was leading to the perception that health promotion does not work and would thereby legitimize cutbacks. They pointed out that most interventions that were put into practice had not been thoroughly studied and only three of the hundreds of interventions currently used were formally recognized as ‘proven effective’. While the designers of the Effectiveness Rating System stressed that the lack of ‘proven effectiveness’ should be used to lobby for more investments in research, several participants said that they were worried that the terminology used by the Effectiveness Rating System was easily misunderstood and used by opponents of health promotion to legitimize reduced spending. Some health promotion practitioners and researchers pointed to a recent decision by the Minister of Health, who used the argument of ‘not proven effective’ to cut back on expenditure for national health promotion programmes.

"The rating system can be used, or abused, to make prevention even less important, and that reduces the budget for research and prevention. You could also argue that when the lack of evidence for effectiveness is noted, but we decide

that prevention is so important for public health, then it could also lead to more research budget to work towards more effective interventions." (researcher/committee member)

Other knowledge and descriptions required

Several participants argued that to better contribute to the improvement of health promotion, more attention must be devoted to other kinds of knowledge and for further enhancing intervention descriptions. Health promotion practitioners were especially interested in the 'story' of how an intervention was realized and implemented, descriptions of how essential elements worked and the assumptions interventions made about local situations. To further improve their planning and decision making, health promotion practitioners and policymakers were also keen on better descriptions of the resources required for an intervention. Several participants pointed out that publications of effectiveness studies provided little insight into what was done to realize an intervention in a specific local context and eventually produce an effect. They emphasized that the format for intervention description used by the Effectiveness Rating System should pay more attention to these aspects.

"If I look purely from a local practice point of view at what is being submitted, it is not a practice story, it is not the story of how an intervention was carried out, what they encountered in practice, what the findings were of those who realized the intervention, what they themselves view as the strengths and weaknesses. What remains hidden is that grey area and all the knowledge that is not made explicit." (health promotion practitioner)

The local adaptation of interventions is ignored

Health promotion practitioners argued that the Effectiveness Rating System completely ignored that the interventions that they put to practice differed from the interventions that were developed and shown to be effective by others elsewhere. While most participants acknowledged the importance of adapting interventions to the local situation, there was disagreement about its consequences for the central rating of intervention. Some participants argued that adapting interventions invalidated effectiveness claims.

"What exactly are you then assessing? You know by definition that something else will be implemented and it may be completely useless. That almost undermines the whole point of rating." (policymaker/committee member)

Other participants argued that, even though adapting an intervention limits the validity of an effectiveness claim, the likelihood that effects are realized remains higher because the working mechanism is still mostly the same.

"So partly you end up with the same and partly you end up with something very different. It could well be that while the execution is very different, it still reflects the same underlying process which has been demonstrated to work at least that one time. You should not automatically assume that it will work just as well in a new setting; a lot could have gone wrong with that translation and so on. But it is at least promising." (researcher/committee member)

Health promotion practitioners and researchers stressed that more attention must be paid to the adaptation of interventions and the implications this has for the validity of effectiveness claims. Health promotion practitioners were interested in examples of successful adaption and lessons learned during this process. They argued that the necessity of adapting interventions to the local situation implies that central rating and effectiveness claims can at best play a modest role.

Discussion

The aim of this study was to explore the functioning of the Effectiveness Rating System and the perspectives of researchers, policymakers and practitioners regarding its contribution to improvement in practice. The results show that the evidence-based-inspired ERS approach was intended to function as part of a larger learning and improvement strategy in which researchers, policy makers, funders and health promotion practitioners were expected to play a role. As part of this larger strategy, the ERS approach was intended to facilitate both the development of available interventions and the improvement of health promotion in practice. The results show that, while participants expected that the describing and rating of interventions promoted learning and enhanced the transferability of interventions, they were concerned that the ERS approach was not suitable for steering and stimulating intervention development and improving health promotion in practice. The expert committees that assessed the interventions struggled with questions about how the effects of health promotion should be studied and what effects should be rated as relevant. Health promotion practitioners were concerned that the ERS neglected the local adaptation of interventions and did not encourage the improvement of aspects like applicability and costs, which they deemed important. Policy makers and practitioners were worried that the lack of proven effectiveness legitimized cutbacks rather than learning and advancing health promotion. These results show that, while the measurement and central rating of the effectiveness of interventions can be beneficial, a narrow effectiveness-focussed evidence-based approach does not necessarily contribute to better health promotion in practice and may even hamper some of the processes that are required for its improvement.

An important strength of the ERS was that the process of carefully describing interventions, which was required for the first rating level, encouraged reflection among intervention submitters, better articulation of intervention components and clarification of roles and responsibilities (Brady et al. 2016). In addition, there were indications that the thorough descriptions enhanced the transferability of interventions and helped users opt for an intervention. The finding that carefully describing and naming interventions is useful in line with analyses by Donald Schön, who has shown that such processes are key components of knowledge development by practitioners (Schön 1983).

The limitations of the ERS emerged with the rating levels that focus on proven effectiveness. Those charged with determining if interventions were proven effective struggled with a lack of norms for what effects should be considered relevant, uncertainty about how health promotion works in complex open social systems and questions about how effects should be studied. These uncertainties, questions and challenges require attention, and show that the functioning of rating committees and the effective use of quality standards and empirical research is predicated on at least a partial agreement about normative and epistemic questions (Kok et al. 2012). Put differently, an evidence-based approach can only work if the people involved agree about what effects are considered as relevant and how, by whom and when those effects can be established (Wieringa et al. 2017).

A problematic finding is that the ERS discriminates against the interventions that are considered most promising in health promotion. The research designs that top the hierarchy of evidence are primarily applicable to relatively simple, sequential interventions with a clear beginning and end, such as a medication that works through a tightly coupled biological or physical mechanism (Berwick 2005). In health promotion, the greatest benefits are expected from interventions that simultaneously target the individual and his environment and comprise multiple components that are intended to be co-constructed in the local context (Hämäläinen et al. 2016; Storm et al. 2014; Willis et al. 2016).

Another finding that requires attention is that the Effectiveness Rating System does not stimulate the improvement of aspects such as the applicability and costs of interventions. While a general description of these aspects was required for the first rating level, they were neglected in the subsequent rating levels. The hierarchy of evidence only stimulated the improvement of the proven effectiveness of interventions, whilst health promotion practitioners and policymakers also need interventions that are cheaper, easier to realize, less demanding of context and more in line with the needs of target populations.

These findings suggest that the Effectiveness Rating System (e.g. choice of committee members, forms for describing interventions, rating criteria) has a too narrow focus on effectiveness and neglects that interventions must be co-produced in diverse local situations. To better steer and promote the improvement of available interventions and health promotion in practice, a broader and more responsive approach is required, which takes into account the role of more actors and factors and knowledge from other sources than effectiveness research.

The lure of effectiveness

The results show that the emphasis on proven effectiveness is a lure which is difficult to manage and can ultimately hamper the contribution to better health promotion in practice. This lure of effectiveness has at least four components. A first is that, while the limitations of effectiveness claims are recognized, the image emerges that what is proven effective must be good, and vice versa. An intervention that is proven effective can still be impracticable, have additional negative effects or be too expensive. At the same time, the lack of proof of effectiveness does not mean that an intervention does not work. Effects may not have been studied or may emerge in a nonlinear way as a part of a confluence that does not satisfy the requirements of a standard experimental study design. A second component is the risk that the assumptions that interventions make about local contexts are neglected. An available intervention contains a 'script' full of assumptions about the local situation (e.g. resources, competences, support). These assumptions are often not well articulated, but essential for understanding what the effective intervention comprised of and for realizing a similar intervention elsewhere (Kok et al. 2012). A third component is the risk that the work that is (and was) required to make an intervention successful is neglected. An available intervention is at best a hopeful design, and realizing it locally in practice requires work by many actors and heterogeneous learning processes. Awareness that most of the work and learning required for realizing an effective intervention has to happen locally is essential (Jansen et al. 2015). The fourth component of the lure of effectiveness is that an illusion can emerge that quality can be centrally *assured*. The quality of health promotion always depends on the local situation and can therefore never be centrally guaranteed (Brug et al. 2010). Central quality *assurance* would require the same exact intervention to be realized at every location, which would seem impossible for the health promotion interventions that generally use a form of suggestion to try to influence anticipatory behaviour, which is deeply intertwined in a complex social context (Kok et al. 2012). Instead of quality *assurance*, the more modest term of *guidance* seems more appropriate.

Similar questions about how to best employ research to contribute to improvement have been faced by those who develop guidelines for clinical medicine (Fernandez et al. 2015; Greenhalgh and Russell 2009). In the early years of the Evidence Based movement, recommendations were directly linked to the evidence for effectiveness. Soon it became clear that other factors than effectiveness (e.g. relevance, costs, side-effects) and the knowledge and experience of other actors than scientists (e.g. health workers, patients) had to be considered when developing recommendations (Zuiderent-Jerak, Forland, and Macbeth 2012). Further reflection showed that high quality evidence should not necessarily lead to a strong recommendation, and a strong recommendation might be required even when the quality of evidence was low (Guyatt 2008). More recent approaches, such as the widely applied GRADE approach, therefore follow a two-step process, in which the quality of the evidence is first determined and a recommendation is then developed in a second stage (Atkins et al. 2005). While GRADE has important strengths and can be used for inspiration, it however provides little guidance towards finding a socially robust way to determine which effects are relevant (Pisani and Kok 2017). Furthermore, approaches like GRADE are not suitable for steering and promoting the process that should lead to the improvement of available interventions.

Towards Responsive Guidance

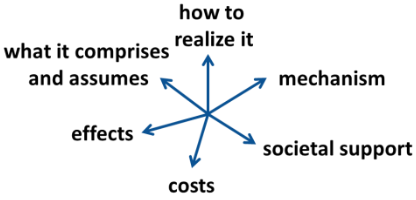
The results provide a number of insights that can be used to design an approach that is better capable of steering and promoting the improvement of available interventions and health promotion in practice. Such an approach, which we will refer to as *Responsive Guidance*, must assume that interventions are locally co-produced and that local learning is required for realizing an intervention that works in local practice (See Figure 2).

Responsive Guidance

- provide guidance to both the **development** and **application** of interventions
- responsive (monitor the contribution to improvement, and if needed adapt guidance)
- inclusive (academia, citizens, policy makers, practitioners)
- recognize that an intervention is a configuration which is locally co-produced

Step 0. Identify the aim of quality guidance & stakeholders

Step 1. Describe the components (or aspects) of the intervention

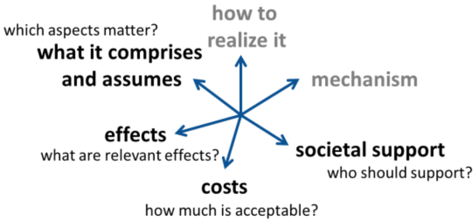


Step 2. Identify which components need improvement

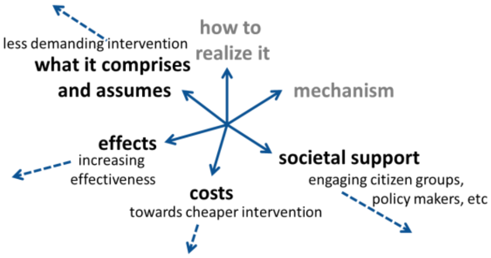
- e.g. costs, effects, societal support, what it assumes of local situation

Step 3. Providing guidance towards improvement

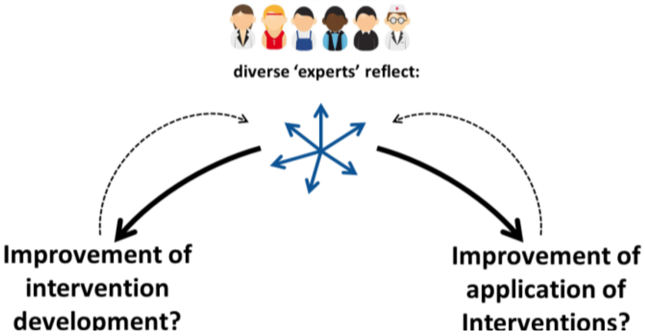
- 1. Better **describing component**
- 2. Developing **shared norms** for component



- 3. Designing a **growth path** for each component



Step 4. Reflect on contribution to desired improvement, and if needed adapt



What a ‘good’ intervention is depends on ever evolving local situations and ideas, norms and perspectives of the people involved. Instead of aiming for a universally applicable list of quality criteria, a more *responsive* approach is required that considers the situations in which interventions have to work. By analyzing the needs and preferences of the involved actors and the functioning of local practices, it can be determined which aspects of an intervention (e.g. applicability, effectiveness, required resources) need improvement and what the direction for steering and promoting improvement should be. After deciding that a certain aspect of an intervention requires improvement (e.g. costs, effects), a first way to stimulate improvement could be to require that these aspects are carefully described (e.g. how much does it cost, which effects have been studied ?). A second step could be to develop shared norms for an aspect (e.g. what effects are minimally relevant, what may an intervention cost?). Reflexive spaces need to be created in which norms (e.g. for relevant effects, acceptable costs) can be articulated and experiences with and results of interventions can be discussed and fed back to the development process (Bal 2017; Wehrens et al. 2011). To further steer and promote improvement, a growth path can be designed that provides further direction to the improvement of an aspect of interest.

The results indicate that, after rating interventions, the provider of central guidance should not sit back and hope that their ratings will be interpreted and used in a way that contributes to better health promotion in practice. A range of efforts may be required to assist potential users with interpreting the provided guidance and discouraging the lure of effectiveness (Andermann et al. 2016). The need for more targeted guidance is recognized by the two-step approach of GRADE, in which simple and explicit recommendations are developed in the second step. Providing guidance for improving effectiveness does not necessarily require that interventions be rated as proven effective or not. A more modest alternative could be described including, for each intervention, whether the effects have been studied and what effects have been found (in whom and in what circumstances).

What is further essential is to generate feedback loops from the practitioner and others who use the recommendations to the rating committees and from the rating committees to the intervention developers. By monitoring the way that recommendations are interpreted in practice, and gathering lessons about the use of interventions, the rating committees can adapt their guidance and can try to better steer and promote the development of new and existing interventions.

A challenge in public health is to develop knowledge that can be useful in multiple situations and thereby minimize the unnecessary duplication of research efforts (Burchett, Umoquit, and Dobrow 2011). The results indicate that the current focus on separate 'interventions' as a central unit of study requires enormous investments in research and may lead to overlap, as interventions with different names may consist of similar activities (Beets et al. 2016). A more efficient way of employing research and learning may be to focus on mechanisms (or combinations thereof) instead of separate interventions (Kok et al. 2015). Knowledge from research and practice can be gathered about these mechanisms and the way in which they produce certain effects in specific circumstances. Such an approach will require the development of a shared language for such mechanisms (and contexts and effects).

While this study provides relevant insights, it also has certain limitations. Ideally, we would have liked to follow the development, submission, assessment, use and improvement of several interventions over time. Conducting such a study would require intensive ethnography at multiple locations and be costly and difficult to organize. The strengths of this study are the large number and diversity of the individuals interviewed and the combination of interviews and observation of the actual functioning of the ERS committees.

Conclusion

The aim of this study was to explore the actual functioning of the Effectiveness Rating System and its contribution to improvement. According to participants, the ERS was expected to contribute to two separate, but linked improvement dynamics: 1) the improvement of available interventions and 2) the improvement of health promotion in practice. While participants expected that the describing and rating of interventions promoted learning and enhanced the transferability of interventions, they were concerned that the ERS approach was not suitable for guiding intervention development and improving health promotion in practice. The expert committees that assessed the interventions struggled with a lack of norms for the relevance of effects and questions about how effects should be studied. Policy makers and health promotion practitioners were concerned that the ERS neglected the local adaptation of interventions and did not encourage the improvement of aspects like applicability and costs. They were also worried that the lack of proven effectiveness legitimized cutbacks rather than advance health promotion. To better contribute to improving health promotion, a more responsive guidance approach seems required; one which stimulates the improvement of different intervention aspects, is more specific about the meaning of the recommendations provided and provides feedback to those who develop and rate interventions. To contribute to improvement, such responsive guidance must always be embedded within a broader learning and improvement strategy, which must include regular reflection on whether that overall strategy contributes to better health promotion and ultimately better health.

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Chapter 6

Emergence and current performance of a health research system in a low-income country: lessons from Guinea Bissau

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Introduction

During the past decades it has become clear that research does not automatically contribute to better action for health. A first challenge is to attune research to the health needs of the population for which it is intended. Research tends to be oriented towards the interests of scientists, funders and powerful interest groups, instead of the health needs of populations and interests of more marginalized groups (Commission on Health Research for Development 1990; Wolffers, Adjei, and van der Drift 1998). Once relevant knowledge is created, a further challenge is to improve its use (Haines, Kuruvilla, and Borchert 2004; Wolffers et al. 1998). Attempts to enhance the use of research findings have for many years focused on better disseminating and explaining the right packages of information and helping receivers unpack and understand findings (Boggs 1992; Roling 1992). More recent approaches stress that the impetus for using knowledge must come from the users themselves, from their conception of the situation and self-identity, interpretation of research findings and capacity to act, which are influenced by local contexts and systems (Dobrow, Goel, and Upshur 2004; Sevon 1996; Sterman 2006a; Van De Ven, A.h, and Garud 1993). Prioritizing research and enhancing its use is difficult, but even more important in low-income countries (LIC) (Arudo et al. n.d.; Commission on Health Research for Development 1990; Kok and de Souza 2010; Ranson and Bennett 2009; Viergever, Olifson, et al. 2010). Traditionally, research in these countries depends on external donor funding, expatriate researchers play a prominent role, national priorities are seldom articulated and there is limited engagement of local governments, which tends to create a vicious cycle in which research is oriented away from national needs and contributes little to local action (Albert, Fretheim, and Maïga 2007; Kennedy and IJsselmuiden 2007; Palmer, Anya, and Bloch 2009; Wolffers et al. 1998).

Developing a well-functioning National Health Research System (NHRS) is seen as an important step for ensuring that health research is targeted to the specific needs of a country and contributes to local action (Commission on Health Research for Development 1990; Kennedy and IJsselmuiden 2007; Pang et al. 2003). A NHRS is described as a set of institutions that create, govern, manage, coordinate, demand, require, communicate and use knowledge resulting from research to improve the population's health and status (Kennedy and IJsselmuiden 2007). Those who attempt to develop NHRSs mostly do so in countries where health research has been conducted in the past. During these research activities, a rudimentary ‘system’ of research may emerge. Such a ‘system’ comprises of patterns of interaction, institutional arrangements and mutual dependencies that emerge from research practices, funding relations and from actors that are performing roles (Rip and Van Der Meulen 1996). Together, these patterns of interaction, institutional arrangements and mutual dependencies form a ‘system’. The fact that a system has emerged in the past, has consequences for those who attempt to develop a NHRS for the future: they do not start with a blank sheet, but have to modulate a *de facto* health research system (HRS) in a desired direction. Note the distinction between a prescriptive system approach, which describes how a ‘good’ system should function (NHRS) and a research ‘system’ as a system-level phenomenon (HRS). System-level phenomena have their own dynamics and build on patterns of (mutual) dependencies that are shaped by institutions such as laws, rules, norms, organizational procedures, etc. When an actor or organization attempts to change a system, it is constrained by these patterns and so often change is minimal or absorbed by the system (Morris and Rip 2006; Sterman 2006a). Since changing system-level phenomena is difficult, it is important to understand how HRSs emerge and evolve, and can be modulated towards well-functioning NHRSs.

A country that has recently embarked on the process of better employing research for the health of its population is Guinea Bissau. This small West African country, with an estimated population of 1.5 million is one of the five poorest in the world. Since independence from Portugal in 1974, Guinea Bissau has experienced considerable political and military upheaval: a few years after the first multi-party elections in 1994 the country fell into a civil war that ended by 2000 after which the country has seen a rapid succession of both military and civilian governments. During the civil war many health workers left the country and the health infrastructure rapidly deteriorated. Ongoing political instability, a lack of trained health workers and low government expenditure on health (estimated at 3 USD per capita in 2006) have hampered the reconstruction of the health system (World Health Organization 2009). Though donor support seems to have been beneficial, it has also led to dependencies of the health sector on uncoordinated and rapidly changing policies of a multitude of donors and agencies (Sodemann 2007). In this volatile, resource-poor and dependent context, health research has been conducted since 1976. Most of the research has been conducted by, or in collaboration with, the Bandim Health Project (BHP), a Danish-Guinean research collaboration which has produced by far the largest part of the nearly 650 research publications that originate from Guinea Bissau (Pubmed indexed publications excluding commentaries). Meanwhile, capacity building efforts have been ongoing and led to over a dozen Guineans obtaining Master and

PhD degrees in health research (Sodemann, Benn, and Aaby 2003, 2008). In 2005 the Ministry of Health (MOH) of Guinea Bissau started to explore ways in which the benefits of health research to its population could be enhanced. A first step was to diagnose the functioning of the existing HRS through the NHRS framework. The case of Guinea Bissau provides an interesting account of an emerging and evolving HRS that started with a Scandinavian 'reconnaissance' research mission in 1976 and continued with expatriate led and donor dependent research which resulted in hundreds of publications and laid the foundation for the current process of NHRS development. The combination of high quality research and a weak and widely challenged health system makes Guinea Bissau a unique case that provides the opportunity to learn more about the functioning of research and development dynamics in LIC. While the attention for the development and functioning of NHRSs in LIC is growing (Ahmedov, De Haan, and Sarymsakova 2007; Alger et al. 2009; Pryor et al. 2009), very few accounts have been published on how HRSs in LIC emerge and function, and no attempts have been made to explore what it means to deal with a 'system'.

For the study presented in this chapter we aimed to analyze how the HRS in Guinea Bissau has emerged and evolved over time and how the present system functions. The importance of developing NHRSs is stressed in numerous World Health Assembly resolutions and in the 2004 and 2008 Ministerial Summits on Health Research (Viergever, Mirza, et al. 2010). Lessons about how HRSs emerge and evolve, and how their functioning can be improved are of relevance to all that seek to better employ research for health.

Methods

We used a qualitative case-study methodology. We conducted document analyses and interviews to iteratively develop an account of the emergence and present functioning of the HRS. This was combined and enriched with a more in-depth exploration of ten research projects and of the utilization their results.

Theoretical framework

The National Health Research System (NHRS) framework was used as an analytical focusing device (see Table 1). The notion of a NHRS was put on the agenda by the report of the 1990 Commission on Health Research for Development (Commission on Health Research for Development 1990). In the consultative meetings before the 2000 International Conference on Health Research for Development, Bangkok, the ideas were further refined. Based upon this earlier work, Pang et al developed the current NHRS framework which describes the functions, components and boundaries of a NHRS (Pang et al. 2003). The main functions that are described are 1) providing stewardship, 2) financing, 3) creating and sustaining resources and 4) producing and utilizing research. For each of these functions, specific components are described (see Table 1). While we used the NHRS framework to focus and structure our analysis, we also explored international dynamics that influence health research and utilization at national level.

Study sample

For this study we reviewed policy documents, research reports and publications and purposively selected 39 key informants based upon their current or former roles related to the prioritization, funding, conduct, distribution and use of health research from or in Guinea Bissau. Interviewees often had various professional roles and worked as health researcher, advisor, policy maker and/or practitioner at the BHP, MOH and its specialized programs or committees (EPI, HIV/AIDS, Cholera, Malaria), international and donor agencies (e.g. WHO, UNICEF, UNFPA, UNAIDS, French Cooperation, Danish Ministry of Foreign Affairs) and three regional health directorates (Bafata, Cacheu and Oio).

Table 1 - Functions and components of a National Health Research System (Pang et al. 2003).

Stewardship

- Define and articulate vision and policy for a national health research system
- Identify appropriate health research priorities and coordinate adherence to them
- Set and monitor ethical standards for health research and research partnerships

Financing

- Secure research funds and allocate them accountably

Creating and sustaining resources

- Build, strengthen, and sustain the human and physical capacity to conduct, absorb, and utilize health research

Producing and utilizing research for health

- Produce scientifically valid research outputs
- Translate and communicate research to inform health policy, practices, and public opinion
- Promote the use of research to develop new tools (drugs, vaccines, devices, etc)

Interviewing and data collection

The interviewing and data collection was done by two researchers (MK and SH) that were not previously involved in research in Guinea Bissau. Thirty-three interviews were conducted in Guinea Bissau, three in Denmark, and one each in Switzerland, United Kingdom and Portugal. Interviews were conducted in English, French and Portuguese and translated to English when necessary. The interviews were conducted for both the purpose of this study, and to inform the interviewees as preparation for the research priority setting process. A general topic list was developed, which was adapted for each interviewee, depending on his or her role, position and expected knowledge about the topic of interest. Throughout the study, new themes and topics emerged and were added to the topic list. To triangulate or further explore emerging themes, examples and key events, specific questions were also added to the interview list. Interviews were recorded and during the interviews notes were taken. Verbal consent was obtained for each interview and it was explicitly stated that the findings would be published, to which there were no objections. The first document analyses and twelve interviews focused on a general exploration of the functions and components of the NHRS. To explore the NHRS functions in depth, ten research projects (3 ongoing and 7 finalized) were chosen in consultation with the Guinean researchers as a diverse sample of the conducted research work that would be relevant for exploring the NHRS. Successive interviews focused mostly on these ten research projects, and on further exploring the emergence of the HRS and the functions of the NHRS. A timeline was drawn for each research project which included the funding, formulation and conduct of the research as well as the dissemination and utilization of the results. For each of these projects the linkages between the research project and the broader context and systems was systematically explored. The scientific publications from Guinea Bissau that seemed most influential in shaping how the research system evolved, and two publications about the history of the BHP, were used to structure the interviews about the historical emergence of the HRS.

Data management and analysis

Directly after each interview, a detailed summary was prepared. These summaries were checked by listening to the interviews a second time. The parts of the interviews that were either complicated or contained parts that seemed important for the analysis, were selected and transcribed verbatim. The interview summaries, transcripts and documents were used to identify themes and key-events that were used to describe the emergence of the HRS. This was done similarly for the ten research projects. A manual coding system was used for the descriptions of the functions and components of the research system. Theme-specific groupings were developed and read, and the themes were modified or amplified. Illustrative quotations were identified to supplement the narrative description of the emergence of the HRS and functions of the NHRS. Preliminary findings were presented and discussed at two national workshops that were co-organized by INASA and the Council on Health Research for Development (COHRED) to inform the main stakeholders of research in Guinea Bissau about NHRS development and prepare for research priority setting. Those involved in the discussions confirmed the presented results.

Results

In this section we first describe the emergence of the health research system in Guinea Bissau from independence in 1974 until 2010. In the second part of the result section, we describe the functioning of the HRS in 2010, using the NHRS framework.

The emergence of health research in Guinea Bissau since independence

In 1974 Guinea Bissau became independent after a violent liberation war. The country started without any Guineans trained in health research and with a complete lack of research infrastructure. The first research activity in Guinea Bissau was a reconnaissance mission sent to the Oio region in 1976, after which the Swedish Agency for Research Cooperation (SAREC) with developing countries, decided to send an interdisciplinary team to Guinea-Bissau in 1978 for a one-year project to examine the nutritional situation in the country and to suggest ways of improving nutrition and reducing child mortality. The scientists, research questions and underlying assumptions (e.g. poor nutrition is the cause of ill health), research practices and funding all came from abroad (Northern Europe). In the same year the Swedish development organization SIDA established the national laboratory for public health (Portuguese acronym: LNSP) in Bissau which performed analyses for medical care and for research. During 18 months, the project collected data in Bandim 1, an urban district in the capital of Guinea-Bissau, and in five rural areas. Research assistants were trained to collect data on births and deaths and a registration system was set up. The collected data showed that the children were not severely malnourished as was widely assumed in the North, but childhood mortality was 400-500/1000. In spite of relatively good nutritional status, measles infection had a case fatality rate of 21% in a large epidemic in 1979. After the project ended Peter Aaby, one of the original researchers, decided to continue working in the country and became the lead researcher of the Bandim Health Project (BHP). A system of continuing data collection was set up to get a better understanding of the causes of high childhood mortality. The data collected showed that the high measles mortality depended on crowding, intensive exposure, and dose of infection [22]. From 1981 measles vaccine was being introduced as a new policy and closely studied throughout the introduction. The introduction of measles vaccines led to a rapid reduction of childhood mortality from 400-500/1000 to 150-200/1000 in the study areas.

From 1983 to 1988 research remained externally funded (Danish Church Aid and DANIDA) and the focus continued to be child mortality. The basic infrastructure for data collection was maintained. A mobile team of nutritional assistants visited villages in the interior of the country for data collection, health education, as well as routine vaccinations for measles vaccine, Diphtheria, Tetanus and Pertussis (DTP) and Oral Polio Vaccine (OPV), combining both health provision and research. In addition, vaccination outreach activities in Bissau city were developed; giving health centers the responsibility for providing vaccinations for the whole of the capital. The BHP was closely linked to local health care provision activities. Vaccination coverage increased markedly in the process and after measles came under control due to the regular vaccination actions, the BHP started studies focusing on diarrhea as the next major cause of child mortality. In the same period Portuguese researchers discovered HIV 2 in samples taken from Guinea Bissau and Cape Verde (Clavel et al. 1986). Through this period collaborations were initiated with projects in The Gambia, Senegal, and Kenya to test whether the observations on measles mortality and crowding were reproducible elsewhere.

In the period from 1989 to 1993, several additional monitoring activities started. Surveillance started in the Biombo and Oio regions to monitor changes in childhood mortality. UNICEF wanted a larger survey to assess neonatal mortality in the country. The surveillance was extended to the Cacheu, Gabu and Bafata regions, covering the five largest regions, which represent 83% of the population outside the capital. An important theme in the research agenda was the growing recognition since 1989 that something was wrong with the high-titre measles vaccine (HTMV). Since BHP could follow the children who had taken part in the HTMV trials, BHP observed that girls who had received HTMV had a two-fold higher mortality than girls who had received the standard measles vaccine in both Bissau and Senegal (Aaby et al. 1993, 1994). These findings were brought to the attention of WHO in writing. After initially dismissing these findings WHO was persuaded through personal discussions to organize an expert meeting which decided that the findings were inconclusive and continued to recommend the use of HTMV. In 1992, the same observation was made on Haiti and after further deliberations WHO withdrew their recommendation of HTMV

(Expanded Programme On Immunization 1992).

From the 1990s ideas about development and aid were changing and led to greater emphasis on capacity building and demand-driven approaches. In 1997 the Enhancement of Research Capacity program (ENRECA) of DANIDA funded the training of Guinean researchers (one PhD and seven MSc), which heralded a new phase in the emergence of the HRS. Most Guinean students had previously taken part in data collection or entry for the BHP and combined course training abroad with their own research projects in Guinea Bissau. This was the first graduate and postgraduate health research capacity building since independence in 1974.

The main research themes during the 1990s were inherited from previous periods including the cause and treatment of diarrhea, the role of retroviral infections, and the long-term consequences of measles infection and HTMV. Many studies attempted to pursue the implications of the previous studies on the role of the non-specific effects of vaccinations for child survival. New projects were started on, amongst others, crowding and health, cholera control, vitamin A supplementation, TB, and the impact of HIV-2. These studies came to an abrupt halt when civil war broke out in Bissau in June 1998, which lasted until 1999. During the war, BHP assumed responsibility for humanitarian aid to the numerous internally displaced persons from Bissau. Though data had been collected in connection with the humanitarian aid activities, it was only from mid-2000 that the main focus again became research and training. Through 1998 to 2002, 8 Guineans finished their masters' and doctoral studies, and became the main group of trained researchers in the health sector in Guinea-Bissau. Many of these wanted to continue research and research training. In 1998, BHP was a founding member of the INDEPTH Network, which aimed to strengthen the collaboration between longitudinal study sites across the world.

In 2000, BHP researchers published results suggesting the possibility that some of the routine vaccinations - DTP and tuberculosis vaccine BCG- might have non-specific effects on child survival (Kristensen, Aaby, and Jensen 2000). The findings that vaccines had systematic non-specific and sex-differential effects were controversial since they questioned major assumptions underlying the standard intervention programs to reduce child mortality. These findings oriented the attention of the BHP researchers to organizations such as WHO that determined the health programs that were recommended to countries like Guinea Bissau. Interviewees generally felt that the international public health community has either chosen to ignore these findings or focused on refuting them, challenging the methods used and speculating about potential sources of bias (Fine 2000, 2004; Folb

2001). Studies with the power to confirm these findings or explore the emerging hypotheses were not being set up (Prentice et al. 2009). The non-specific effects of vaccines and interactions of childhood interventions has remained an important theme in the research agenda of BHP since 2000.

The trends of expansion, growing Guinean involvement and diversification of the research agenda have continued since 2003. Collaboration with local institutions such as the national hospital and with the national TB and HIV programs has further reinforced links between research and the health system. The study area of the health demographic surveillance system of BHP was expanded to include a population of over 100.000 and now cover all 10 regions in the country. This expansion was partly funded by the MOH (and World Bank) with the aim to inform national policy with health indicators. An extension of the ENRECA program led to the training of an additional 4 MSc and 5 PhD students. The increasing number of Guinean researchers and growing interest in research at the MOH further strengthened links between the research system and the MOH, as illustrated by the following quote.

"All of us (Guinean researchers), we worked before in the health system, we knew the problems that are there and we have ideas of things that are not going well. We try to think what to do. We start also creating areas of research that are closely related to the health system and that could easily be used and solve the health system problems."
(researcher/policy advisor)

In 2005 the MOH of Guinea Bissau started to explore ways in which the benefits of health research to its population could be enhanced. A senior official at the MOH approached COHRED to facilitate the process of developing the functions of a NHRS. The initial steps were to diagnose the functioning of the existing HRS through the NHRS framework, prepare a policy for health research, inform and engage stakeholders and initiate research priority setting. With support of the International Association of National Public Health Institutes (IANPHI) the Guinean Government prepared for the establishment of its own National Institute of Public Health (Portuguese acronym: INASA).

The functioning of the health research system in 2010

In this second part of the result section, we describe the functioning of the HRS in 2010, using the NHRS framework (see table 1). First a short overview is provided, after which the separate functions and important components are described in more detail.

The functioning of the HRS in 2010 is shaped by recent capacity building efforts and institutional reorganization, combined with the practices, human resources and structures that have been developed since the mid-seventies. In addition, the current HRS is influenced by the overall volatile and resource-dependent context within which it functions. With the development of INASA and the initiated priority setting process, the national government is taking a more substantial role in stewardship for health research. For financing, the research system remains almost exclusively dependent on external sources, and their willingness to align to local priorities. The training of Guinean researchers has reinforced the links with the health system, broadened the research agenda and enhanced local use of research. Despite this important progress, there are still only a few Guineans with a PhD in health research, and collaboration with external partners for training remains essential. While nearly 650 scientific publications originate from Guinea Bissau, the use of research results in the country remains limited. Interviewees described how the use of results within Guinea Bissau has been constrained by the weak and donor dependent health system, volatile government, top-down policies of international agencies, and the controversial nature of research findings. At the same time, interviewees provided some examples of the uptake of research results in health policies of the national government and locally working NGOs.

Stewardship

The legal framework that institutionalizes health research in Guinea Bissau is provided by the Cabinet approval for INASA in 2009. INASA is designed as an independent body within the MOH and reports directly to the Minister of Health. Health research has also been integrated in the national health plan of the MOH, where research is described as essential for informing health policy, practice and innovation. Interviewees described how until recently, research topics have mostly been determined by expatriate researchers and international agencies commissioning research, and are limited by the priorities of donors and other funders.

"For several years, research was driven by the priorities of (Danish director of BHP), what he thinks is important. We think those (priorities) are important, but we also need other research." (researcher)

The training and increased involvement of Guineans in research since the end of the nineties has resulted in new research topics that are more closely related to national policy making (e.g. health worker salaries, quality of care).

The process of setting national research priorities is currently in progress. Representatives of all major health research, policy and practice organizations and representatives of donors and foreign agencies working in the country are engaged in this process. A first priority list is expected in 2011. The ethics committee is functioning with difficulties due to a lack of capacity and funding. At present ethical clearance for research is obtained through partner institutes and through the local ethics committee, though often with delays and additional review abroad.

Financing

Research for health in Guinea Bissau depends on securing foreign funding sources for all costs (including salaries, equipment, supporting staff and all project costs) except for the salaries of a few Guinean INASA researchers and some supporting staff, which are funded through the MOH.

Creating and sustaining resources

In the recently established INASA the BHP, National Public Health Laboratory, Tropical Medicine Centre (Centro de Medicina Tropical), former Department of Epidemiology (DHE), and former Information and Communication Department (DIECS) of the MOH are brought together. The BHP is a collaboration between the MOH and the Statens Serum Institute, Denmark. It currently employs 14 researchers in Guinea Bissau (7 Danish, 8 Guineans) and 8 in Denmark, over 150 research assistants and some supporting staff. The National Public Health Laboratory performs tests for various organizations in the health system and functions as the research laboratory for INASA. The country's social science institute INEP has 55 employees of whom 16 are researchers and 4 have a PhD degree. INEP has conducted various health related research projects for international agencies, such as a Knowledge, Attitude and Practice (KAP) study on water and sanitation (funded by UNICEF). In Guinea Bissau there is no university curriculum for health research and almost all Guinean health researchers have been trained through BHP and its partner institutions abroad. In total, the country now has 6 PhD-level health researchers (and 2 enrolled) and 12 master-level health researchers, which all have degrees in public health and epidemiology. No capacity has been developed in health economics, services, policy or systems research.

Physical research infrastructure

Though a basic physical infrastructure (water pumps, generators, freezers on natural gas) for health research has been established, the poor infrastructure in the country makes this a day to day challenge. Equipment is shipped in containers from Europe to countries near Guinea Bissau, which takes a long time to arrive and is expensive. The access to scientific publications is limited to the researchers at BHP and INASA through the Portuguese version of HINARI (a program that provides free online access to the major journals to local institutions in developing countries) and collaborating partners in Europe. Internet is available in the capital Bissau, and in 3 of the 11 regional health directorates in the countryside through unreliable phone connections.

Producing and using health research

The number of publications indicates that by far (>95%) the most health research in the country has been conducted through the BHP, which has focused mostly on understanding and reducing child mortality. Major research themes have been childhood infections and management, vaccines and childhood interventions. These themes have been studied through large-scale and long-term epidemiological observational studies and randomized trials, with a specific focus on non-specific and sex-differential effects of these interventions and the possible interactions between different interventions. In recent years the BHP research agenda has widened with studies on maternal health, some studies on tuberculosis and HIV prevalence and on improving hospital care in the pediatric ward. In the past, Swedish and Portuguese expatriate researchers have conducted various studies. The most significant contribution was the isolation of HIV2 by the Portuguese researchers (Clavel et al. 1986). Recently, some researchers from the UK have started research as part of a program called Effective Interventions, which focuses on lowering infant mortality rate through community-based health promotion in the Tombali and Quinara District. In addition, an Italian research group from the University of Padova is conducting a collaborative study on malaria prevention together with the National Reference Hospital for Tuberculosis and Lung Disease in the capital Bissau, and a Brazilian and Portuguese collaboration is conducting a research study on traditional medicine.

Efforts to enhance research use

Interviewees described different approaches to enhancing the use of research results in Guinea Bissau. Traditional structures for disseminating research results are very limited: there is only one scientific journal in the country which features social science. There has been one special edition on health research, which seems the only national health research publication in the country since independence (INEP 2002). Interviewed health workers at the MOH and in the regions were aware that research was conducted in the country, but were knew little about the research themes and topics of the conducted research. Until 2004 research papers were translated from English to Portuguese and disseminated locally to relevant health officials. According to interviewees, this has been halted because the translation was costly and the capacity to interpret these papers was limited to a few people in the country that were also proficient in English. Until 2008, BHP researchers have organized a number of dissemination meetings at which researchers presented their findings and discussed them with decision makers. Since then, there has not been an organized approach to disseminate research results in the country, and dissemination depends on the initiative of individual researchers.

Interviewees described that the most effective strategy for enhancing the use of research results in Guinea Bissau is personal interaction between researchers and policy makers and officials from MOH, NGOs, international agencies, and advocacy by researchers. All Guinean researchers also have tasks in the health system such as medical doctor, nurse, or advisor in boards and on *ad hoc* committees.

"*The Guineans, we are really inside (the health system). Even today if I want to discuss something with the Malaria director, I go and discuss. For vaccination (…) is in the committee. For the strategic national plan, we were consulted. If we want to see the Director General or Deputy Minister, there is no problem, they are interested.*"
(researcher/policy advisor)

These interactions were deemed effective because the meaning of research findings can be explored through dialogue in the context of decision making. The small size of the health policy and research communities has also helped to establish trust which is important for discussing difficult findings such as the over-diagnosis of malaria or asking for illegal user fees to patients.

The use of research findings at the national level is constrained by the weak status and lack of absorptive capacity of the health system, the prominent role played by international agencies and NGOs and the nature of the research.

The country's health system functions with very few resources and a shortage of health workers within a politically instable context, which has made it difficult for the government to realize improvements based on research findings. International agencies and NGOs have stepped in to organize and support health services and provide the health system with advice, targeted funding and other support. These organizations have enhanced the use of research and innovations from other countries by stimulating the use of protocols, guidelines and new treatments. In addition, international agencies and NGOs have also commissioned some local studies (such as KAP studies on water and sanitation) that were used by themselves and the MOH, amongst others. The local opportunities of health professionals to act on research findings often depends on the perceptions, funding, advice and policies of international agencies. Though international agencies and NGOs have in some cases used local findings, the interviewees described several cases in which international agencies and NGOs failed to inform themselves of the locally conducted research or pushed their own protocols and practices despite local findings that indicated that other strategies might be more beneficial. An example is the interference of international agencies when the Guinean researchers promoted the use of their findings that showed the protective effect of lime juice in food and water against cholera (Rodrigues et al. 2000). Interviewees described how international agencies working in Guinea Bissau have pressed the MOH several times to not use these findings during a cholera outbreak and promoted their own guidelines instead. Requests by the local researchers for a meeting to discuss these findings and share arguments have remained unanswered.

Another factor that has made it more difficult to contribute with research to local decision making is the nature of some of the key research findings from BHP. Since the beginning, their research findings have challenged established global health assumptions and policies. Research studies showed that infectious diseases and not malnourishment were the major cause for child mortality in Guinea Bissau and that vaccination against measles was not only possible, but also protected against more than just measles (Aaby et al. 1983, 1984). Their studies on the effect of the WHO recommended High Titer Measles Vaccine showed increased mortality and led, together with later studies, to the international withdrawal of the vaccine (Expanded Programme On Immunization 1992). Research findings from the BHP have continued to challenge established global health policies with growing evidence on the non-specific effects of routine vaccinations and vitamin A supplementation (Aaby et al. 2010; Benn et al. 2009). Though these findings have large public health implications, publishing them has not been enough to have these findings openly debated and the implications explored, let alone influence global health policies. Interviewees described that advocacy efforts such as writing letters and personally initiating meetings have been necessary to even get findings considered. The intense entanglement in the global health community of research funders, policy makers and donors is described by interviewees as a major cause for this.
"*There is only one structure. It is the same structure which is funding the policy, deciding the policy, funding the research and training people to do the same thing as funders want them to do. There is no alternative, there is no public space. A free space to learn does not exist. This is a monolithic structure and the same thing will be reinforced.*"(researcher)

Despite these challenges there are many examples in which research results were used to contribute to health policy and practice in the country. Measles vaccination became national policy after it was shown to be effective, studies on HIV led to better targeting of prevention activities, the recommendation to use lime juice is currently used and recently the salaries of health workers have been increased after a study showed that this would improve performance (Biai et al. 2007).

Discussion

The aim of this study was to analyze how the HRS in Guinea Bissau has emerged and evolved over time and how the present system functions. Our findings provide analytical insights and lessons for those who attempt to better employ research for health in LIC.

Research practices and the systems in which they take place co-evolve over time (Rip and Van Der Meulen 1996). In the emergence of the HRS in Guinea Bissau, this co-evolution (or mutual influencing) can be seen in two ways. A first way is the influence of the international research and development dynamics on local research. International funding, priorities, training, knowledge transfer, trends and controversies have oriented the conducted research to those aspects of health that are of international interest. The results of some of this research have been used extensively at international level and an important contribution has been realized to international scientific progress and global health. At the same time, there has been much less attention for research questions that are specific and essential for local decision making. This includes the local research that is necessary to safely and efficiently employ internationally developed innovations (with vaccine safety research as the exception).

Countries like Guinea Bissau have little influence on international research and development dynamics, but can attempt to attune the available support to local needs and demands. The MOH has therefore started to develop a research policy and the recently established INASA is coordinating the process of setting national research priorities. Developing these and other functions of a NHRS aims to stimulate research that is attuned to local needs and contributes to local decision making. The challenge is to develop such a nationally oriented research stream in addition to the internationally oriented stream, and explore opportunities for mutual reinforcement.

To contribute with research to better action for health, alignment needs to be created between research and relevant decision-making processes. Personal interaction between researchers and influential users is often an effective step towards such alignment. To develop effective personal linkages, one needs to determine at which level (local, national, international) and by whom (practitioners, MOH, international agencies, NGOs, etc) relevant decisions are actually made. Our findings indicate that some far-reaching decisions are made at international level (e.g. on the vaccine schedule, cholera guidelines) and are practically imposed on the country. Our results indicate that the opportunity of Guinean health officials to use results from local research is severely constrained by the dependency on external resources, donor policies and technical advice. This worrying dynamic is likely to occur in other LIC as well and requires attention. International organizations that fund research, provide technical advice or promote health interventions in vulnerable LIC should be more aware of the local dynamics they create. Together they influence what research is being conducted and which research results are being used. An important step forward is to respect and support the strengthening of the role of the national government, as was agreed upon in the Paris declaration and Accra Agenda for Action (OECD 2005).

The second way co-evolution of research practices and systems has taken place is *within* Guinea Bissau. Our findings show that during the past decades, a rudimentary 'system' of research has emerged through the research practices within the country. While this system has many international dependencies, local patterns of interactions and institutions have also emerged. Since a (rudimentary) system has emerged, subsequent efforts to develop a NHRS are best understood as attempts to modulate a *de facto* HRS in a desired direction. By taking into account system level phenomena (e.g. endogenous evolution, resiliency to change), involved actors can increase the likelihood that NHRS development succeeds (Roling 1992; Sterman 2006b).

Ultimately, to achieve a sustainable NHRS a continuous dynamic has to be realized *within* the country through which local priorities and funding leads to local research that contributes to local action. Only the national government can realize such a system. Our findings suggest that attempts by a government to develop a well-functioning NHRS may actually be constrained by international research and development influences. It is therefore crucial that the international community enables the emergence of a well-functioning NHRS by aligning funding and capacity building to national priorities, stimulating local investment in research and providing demand driven technical assistance. Besides the importance of NHRS development, this study also points to some weaknesses in the NHRS approach. The focus on the national level is appropriate for only some of the many heterogeneous routes through which research contributes to action. More attention is needed for the linkages to research dynamics and decision making at the more local (e.g. district health directorate) and international level, and other ways of informal and organized learning such as monitoring and evaluation.

Another shortcoming of the NHRS framework is the lack of explication of *how* research is to contribute to better action for health. 'Research use' is described as one of the functions of a NHRS, but the framework does not indicate *how* research results are to contribute to better action for health, and provides little guidance on *what could be done* to strengthen the realization of such contributions. The examples of research use in Guinea Bissau indicate that these processes are more complex than often described, but also provide lessons for enhancing research use. Targeted engagement of potential end-users in the formulation, conduct and interpretation of research, sustainable interaction, trust, and active engagement of researchers in health decision making processes, all seem to have enhanced the use of results to contribute to action. Similar patterns have been found in recent case studies (Jakobsen et al. 2008; Mullholland and Barreto 2001; Prentice et al. 2009; Shann 2010) that indicate that the contribution of knowledge to action ultimately depends on the end-users and the contexts in which they function. These shortcomings suggest that a more refined systems approach could be useful to better understand the link between the production of knowledge and the use of knowledge to contribute to better action for health.

In Guinea Bissau, the development of some national research capacity (through BHP and ENRECA) provided the foundation to start NHRS development. NHRS development now seems important for further attuning research capacity development to local needs. Just as in other countries in the region, capacity development will remain dependent on South-South and North-South collaboration. Further developing collaboration and networks within the region might be a step forward.

Concerns about the functioning of the international research system

The final consideration that follows from our diagnosis is that in addition to better aligning research to national needs, a stream of research is needed that is more independent from established global health funders and policies. The research conducted at the BHP and the contributions it has already made to global health show how essential it is to have independent researchers following controversial findings and be able to challenge dominant views and policies. In multiple interviews and in various published commentaries, concern is expressed for the lack of an open scientific debate about some of the more controversial research findings, such as the positive and negative non-specific effects of vaccines (Jakobsen et al. 2008; Mullholland and Barreto 2001; Prentice et al. 2009; Shann 2010). Though these issues require more detailed analyses, our findings indicate that donors, policy makers and research funders in the global health community are closely entangled and have attempted to mediate the controversial research findings away, instead of welcoming them as an incentive to learn. This raises questions about the ability of the global health community to productively deal with scientific controversy. This indicates that in addition to better aligning research at the national level, arrangements for more independent critical research and debate also requires attention. If combined, these points lead us to call for a more heterogeneous architecture for health research, with a stream of research that is better aligned and embedded within NHRSs and a stream that is more independent and less entangled with international (donor) policies.

This study focused on one country and so the extent to which the findings may be reproduced in other countries is uncertain. However, the study included a large sample, with a wide range of actors involved in research and policy in Guinea Bissau and at the international level. It is hoped that the detailed exploration presented here can be used to further develop our understanding and modulation of the emergence and functioning of health research systems in other contexts.

Conclusion

In Guinea Bissau a *de facto* 'system' of research has emerged through research practices and co-evolving national and international research and development dynamics. If the aim of research is to contribute to local decision making, it is essential to develop the functions of a NHRS. This means modulating the emerged system by setting national research priorities, aligning funding, building national research capacity and linking research to decision making processes. Donors and international agencies can contribute to this process by giving technical support, coordinating their efforts and aligning to national priorities.

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Chapter 7

Exploring the societal impact of research: towards a contribution perspective

Exploring the societal impact of research: towards a contribution perspective

Introduction

To more effectively employ research for health, it is essential to evaluate its impact (Smith 2001). During the past decade, a variety of methods have been developed for assessing the 'societal impact' of research (Banzi et al. 2011; Bornmann 2013; Buxton and Hanney 1996; Hanney et al. 2003; Kuruvilla et al. 2006). While important progress has been made, difficult challenges have been reported, most of which are linked to the dependent variable 'impact'. A recurring analytical problem is how eventual changes in action can be attributed to a research project as source, when other inputs also play a role. Other problems result from the diverse and diffuse nature of the process of translating knowledge into action for health (Solans-Domènech et al. 2013; Wathen et al. 2013). Knowledge can be used directly by identifiable users, but can also become part of a variety of reservoirs from which it slowly mixes with changing ideas and then 'creeps' into evolving theories, policies, practices and technologies (Weiss 1979, 1980). As a result, knowledge may be used at unknown times and places by users who are not aware of where they gotten their knowledge. The diffuse and diverse nature of translation to action processes can make it practically impossible to map such downstream 'impacts'. While these problems are increasingly recognized, existing methods for evaluating 'impact' provide little guidance for dealing with them (Bornmann 2012, 2012). Moreover, these methods are generally designed for accountability purposes, but seem to lack the detail that is needed for learning how to more effectively employ research for health. A learning-oriented approach requires a thorough understanding of how knowledge is translated to action and research has 'impacts'. While there is a lot of literature on knowledge translation in the health sector, it remains unclear what the use of research knowledge is and how that leads to impact (Greenhalgh and Wieringa 2011).

The aim of the study presented in this chapter is therefore to construct an empirically based operationalization of the societal impact of research that is useful for research monitoring and evaluation. We followed an iterative, case study based approach in which we mapped how six research and translation processes in Ghana and Guinea Bissau evolved. The empirical analyses that we present show how the societal impact of research depends on the agency of multiple actors and the evolving circumstances in which they are embedded, and cannot be attributed to a research project as point-source. We therefore conclude that instead of trying to measure and attribute 'impacts', it is more realistic and useful to focus on the 'contribution to action'. Based on the empirical analyses, we develop an operationalization of a contribution to action that seems useful for evaluating research use and for learning how to better employ research for health.

Methods

Our search for an operationalization of societal impact started in 2005, when the Ghanaian-Dutch Health Research for Development Program (HRDP) requested an assessment of the impact of the research they had funded and an analysis of how this 'impact' related to the way research was organized (Wolffers and Adjei 1999; Wolffers, Adjei, and van der Drift 1998). Since available methods for research evaluation seemed unsuitable for learning how 'impacts' were realized, we set out to develop an approach that focused on unravelling how research and translation to action processes evolved.

Initially, we focused on 'impact' as outcome measure. During four case studies in 2005-2006, we struggled with the attribution problem and challenges such as identifying the users of research. While we learned that more distal and long-term 'impacts' were almost impossible to assess, we identified a variety of proximal contributions that seemed interesting. In 2007-2008, we analyzed two new research projects. The reflection on these analyses inspired us to replace the 'impact' focus with the more realistic notion of a 'contribution to action', which we then operationalized by reanalyzing the collected data and assessing a new case in Guinea Bissau in 2009.

Contribution Mapping

Data were collected according to Contribution Mapping. Contribution Mapping involves three stages in which research and translation in action processes are iteratively mapped (Kok and Schuit 2012). For each assessed case, a three-phase process map is developed that includes the main actors, activities and interactions during the 1) formulation phase, 2) production phase and 3) the knowledge extension phase (e.g. dissemination and utilization). Contribution Mapping focuses on the actors involved in, or interacting with a research project, and the most likely influential users amongst them, which are referred to as potential key-users.

We prepared for the case studies by reading available research documents. The mapping process started with interviewing the investigators of a research project to develop a first version of the three-phase process map and identify potential key-users and translations. Next, potential key-users and other informants were interviewed to trace, explore and triangulate possible contributions. In the third stage, the preliminary results were shared with the stakeholders for feedback and validation.

Selection of cases

Six research projects were purposively selected based on diversity of the subject, expected translations to action and organization embedding. After the five cases in Ghana, we selected a sixth case from Guinea Bissau because it provided a different low income country context. All selected projects were led by a local principal investigator (PI).

Interviewing process

Twenty-nine interviews were held with 22 purposively selected key informants. Six of these were the PIs and 9 were selected as potential key-user. Most had a leading role at a Ministry of Health (MOH), the Ghana Health Service (GHS) or other health organizations. The other 7 participants were interviewed to further explore, triangulate or elaborate descriptions of translation processes and contributions to action.

Interviewees were asked to describe in detail how the research formulation and production phase had evolved, and how results were disseminated and translated to action. These descriptions were used to develop the three-phase process map. Interviewees were encouraged to be specific about processes and interactions and encouraged to provide detailed examples.

After mapping these processes, interviewees were asked to describe the 'impacts' of research (in 2007 we replaced the term ‘impact’ with ‘contribution’). The described contributions were then critically explored in relation to the translation to action processes.

Emerging descriptions of translations and contributions to action were triangulated with subsequent interviewees, who could also put forward new stories of contributions. Interviews were audio recorded and transcribed, except in two cases when equipment failed and a detailed summary was made directly afterwards.

Data analysis

Data were analyzed by two interviewers and one research assistant. Interview summaries and transcripts were used to iteratively develop the three-phase process map and describe the contributions, using constant comparative method of analysis (Pope, Ziebland, and Mays 2000). For the operationalization of a 'contribution to action', data were analyzed manually by coding statements from the interviews according to topic. This was first done separately by one of the researchers and the assistant, after which the emerging themes and formulations were discussed.

A report of our findings was shared with participants and no remarks were made regarding how the data was presented.

Results

We will begin by describing our attempt to assess the ‘impact’ of research. We then show how, in the process of conducting this research, our empirical analyses convinced us to focus on the ‘contribution to action’, rather than the problematic notion of ‘impact’. Through further analyses, we arrive at a realistic operationalization of a ‘contribution to action’. We also identify four contribution categories and develop criteria for ‘what counts as’ a ‘contribution to action’.

Case 1-2

We set out in 2005 to assess the ‘impact’ of research. Inspired by evaluation literature, we initially defined the ‘impact’ of research as the change in action for health that resulted from research. In traditional evaluation approaches, such ‘impact’ should be assessed by comparing the situation in which research had been conducted with the situation in which research had not been conducted (Ravallion 2001). The difference between these two situations is then the ‘impact’ of research. Since there is no counterfactual in research evaluation, we set out to determine ‘impact’ by collecting narratives of how research and translation processes had evolved. To test our approach, we initially selected four research projects that had been finished 6-12 months before the assessment.

Case 1: Implementing Community-Based Health Services

In the first case, we identified several 'impacts'. The study aimed to assess the effects of implementing the Community-based Health Services and Planning Initiative (CHPS) in a district in northern Ghana. While the beneficial effects of CHPS had previously been shown, this study showed how it could be implemented at district level and increase the access to, and quality of, health services. The study was led by a regional director of the GHS, who took on a leading role in scaling up CHPS. Two interviewees described how the study informed the national implementation of CHPS. Specifically, the results were used to design a training program and support package for implementing CHPS. The PI, who played a key role in the use of the results, remarked: *"It is no longer* *optional, it is a must. Every district must implement CHPS. If this study would not have been conducted, we would not have shown this. They would say: how do you know that when you do this in a district, put a nurse in a community, people would come to her?*' (PI 1) A third interviewee also described how the results informed the implementation of CHPS: *"This is now being used by the Ministry as a blue print, because of this research"* (Policy maker 13). According to the PI, the study was also essential in establishing the Nkwanta Health Development Center, which facilitated the CHPS implementation: *"The new center that is being built right now, it all started with this project"*(PI 1).

Case 2: Stigma of HIV/AIDS patients

The second case led to several questions about what societal impact actually was. The study assessed the stigma of HIV/AIDS patients and the attitude of the population towards HIV/AIDS patients. The study revealed, amongst other things, that some of the nurses tended to stigmatize HIV/AIDS patients. *"Some of the people with HIV, they had already been informed about their disease, but here was the case that we met some of them, who hadn't been talked to. No one had informed them. We organized a meeting, got back to the nurses and talked about the situation. Some were so behind. We taught them how to treat them* (HIV/AIDS patients) *in a better way.* (…) *Changes in health care start at the lower level"* (PI 2). Apart from the feedback meeting with the nurses, there were no indications that the results were used in action.

The study did inspire a new research project that was still ongoing during the impact assessment.

Reflecting on case 1-2

While analyzing our data, we wondered whether the feedback meeting in case 2 should be considered an 'impact' and how that should be decided. While meaningful, the feedback was provided only once to a few nurses and was directly linked to the research activities. The contribution of the results to the new study also seemed important to describe, but was not what we considered a societal impact.

These findings inspired us to make a distinction between three impact categories: 1) impacts through the research activities, 2) contributions to research, such as the new study, and 3) impacts that resulted from the use of the produced knowledge.

To determine whether a translation in action should 'count as' an impact, we decided to aim for relative agreement among the selected key informants. In case 2, both the PI and a GHS district director described that the formal results had not been used in action. We had thus identified an impact linked to the research activities and a contribution to research, but no impact through the use of the results.

Case 3: Community based HIV/AIDS prevention

The third case illustrated the relevance of the first impact category: impacts through research activities.

The study aimed to assess the communication of HIV/AIDS prevention messages through unorthodox community-based means, such as drama, music and games. In rural villages and schools, a play was performed together with a brass band, a resource person talked about HIV/AIDS and educational games were played. While the project was a study, the PI intended to contribute to local health through the research activities. *"I did it as a community project for my area (…) It was collecting data, but we were educating people on the dangers of AIDS. How to protect themselves, how to take care of those who are living with the virus and that sort of things. People learned a lot. We even made them see the need for voluntary testing because that can help them live longer."*(PI 3). A nurse confirmed the local impact of the research activities*: 'I know more people were going for voluntary testing. And I know that the stigma towards the disease went down. (…) The people no longer considered them sinful. It was a good educational program, we learned a lot. They were the first who came there and made them understand something about HIV/AIDS"* (community nurse 31).

While the results of the project seemed promising, they were not disseminated by the researchers and there were no indications that the results were used elsewhere. *"All the impact was part of the project itself. I have not disseminated, you should ask the Ghana Dutch* (HRP) *what they have done"* (PI 3). No contributions to research or impacts from the use of the results could be identified.

Case 4: Antimicrobial resistance study

The fourth case that we assessed was more complex and made us question the very notion of 'impact'. The assessed project was a study into resistance to antimicrobial drugs. The PI, a professor in microbiology, introduced the study by expressing grave concerns about antimicrobial drug resistance and a lack of information and laboratory capacity to confront this challenge. Throughout Ghana, most antimicrobials were widely available to the public without a doctor's prescription and when prescribed in health facilities, culture and sensitivity tests were often not performed. Another concern was that traditional healers mixed antibiotics with herbs and sold them on the market. In addition, there were indications that the skills, practices and equipment in the laboratories in regional and district hospitals were insufficient for producing standardized results.

The study objectives were to: 1) identify the agents of bacterial infection in Ghana, 2) establish their antibiogram and determine the minimum inhibitory concentration of multiple drug resistant bacteria and 3) set up a surveillance program for bacterial infections and antimicrobial resistance. To test the performance of the health facility laboratories, samples were sent to different laboratories throughout the country and the results were compared with those from the National Reference Laboratory. The study thus had several objectives and the researchers clearly aimed to contribute to action.

Throughout 2003, in hospitals in nine out of ten regions of Ghana, 5099 bacterial isolates were collected and tested for antimicrobial susceptibility and multiple resistant bacterial isolates. A high percentage of resistance was observed for commonly used antimicrobials, such as tetracycline (82%), ampicillin (76%) and chloramphenicol (75%) (Newman et al. 2011). The prevalence of multiple drug resistance was also widespread among the isolates. Biochemical identification of retested organisms was similar between the regions and teaching hospitals, but 61% of the sensitivity results were different in retesting. A first research report was submitted to the HRP in December 2004. The report contained fourteen recommendations, such as training laboratory technicians, providing laboratory equipment, encouraging clinicians to investigate causes of infection, re-evaluating criteria for the use of antibiotics, enforcing laws on the sale of antibiotics, educating the public about their use and setting up a national committee to deal with drug resistance.

In May 2005, the PI and a research assistant were interviewed. While the PI described detailed dissemination plans, the results had not been made public, because the final report was not yet approved by the HRP. While the case seemed promising, we had to come back later to assess its impact.

When we returned in early 2007, the report had been approved and the results had been presented at the MOH and the Reference Laboratory and discussed with the head of the Quality Assurance Unit of the GHS and the manager of the National Drug Program. The participating hospital laboratories had received feedback about their performance and a research assistant had visited several laboratories to discuss the findings.

While the results seemed important and potential key-users were aware of them, the 'impact' of the research seemed very limited. The head of the Reference Laboratory had put forward a plan to train laboratory technicians throughout the country, but soon after this he retired. His successor was aware of the results, but did not mention any training plans and pointed to the lack of funding for such initiatives. The head of the Quality Assurance Unit described ideas to encourage laboratory testing before prescribing antibiotics, but struggled to secure funding. The most concrete 'impact' that could be identified was a training program for laboratory technicians that was initiated by one of the participating hospital laboratories. So far, the training had been organized in one laboratory and it was planned for two other regional hospitals. Despite the many plans, the identified 'impact' thus remained limited to locally organized training for laboratory technicians.

Since the case was interesting and we wanted a critical look at our approach, we asked a second researcher to also map the impact of case 4. The PI was interviewed again, as were four potential key users. While similar improvement plans were described, the interviewees seemed to have accepted that a lack of resources made it impossible to realize these plans any time soon. No interviewee could confirm that the planned training for laboratory personnel had taken place in any other regional hospitals.

One additional interview then changed the mapped impact. During our feedback meeting, the PI suggested that we should interview a specific director from the GHS who might know more about the use of the results. This new interviewee described a significant translation process: *"Yes, the resistance study, that was useful, yes. Each time we had discussions about the essential medicine, that study came up. We are having a problem with resistance to common medicine, antibiotics. That is what they showed. That we are having problems. It was a good study. For the list, the essential medicine list, we had to decide. What do we recommend? What should be prescribed? It is difficult. That study was very helpful. It opened our eyes. At headquarters, you do not know that unless you have these studies. We should do more studies, but funding, ah"* (PM 44). Another policy advisor specified the role of the results in decision-making about the essential medicine list at the GHS headquarters.

Reflecting on case 3-4

Our empirical analyses of case 3 and 4 had led to several questions regarding 'societal impact' which required reflection. A first issue was that the 'impacts' that were identified clearly depended on the selection of interviewees and on the time frame that was assessed. We thus had to carefully consider the selection of interviewees and timing of the interviews, and be explicit about the choices made.

The assessed cases also led to the question of how much 'change' was needed to be deemed as 'impact'. Was it enough when results were considered important by leading policy makers? Should results play a role in policy plans, or should such plans be implemented before it can be deemed to have had an impact? How successful should that implementation be? Did the drug resistance study have 'impact' because a training program was organized in a hospital laboratory? Or would that training have to be organized in all ten regions of a country? Who was to decide how the results should be used? What if research had 'negative results' but moved the research agenda in a new direction?

An obvious lesson was that what we described as the 'impact' of a research project clearly depended on the efforts of multiple actors and the evolving circumstances under which they were embedded. 'Impact' depended on a 'user', who put forward a –more or less explicit– future plan in which the results played a role. All kinds of efforts, resources and circumstances were then required to realize those plans. In the antibiotics example, the described plans required funding and equipment and efforts from policy makers, health workers, laboratory technicians, traditional healers and even the general public. When so many people, artifacts and circumstances played a role, how could an ‘impact’ ever be attributed to a research project as source? These issues resurfaced when we analyzed another research project in Ghana in 2007-2008.

Case 5

Case 6: Infectious diseases among prisoners and officers

Case 6 finally convinced us to drop the ‘impact’ metaphor and replace it with a ‘contribution to action’. The study had assessed the prevalence of infectious diseases (HIV, Hepatitis B and C, Tuberculosis and Syphilis) and risk behaviors among prison inmates and officers in the three largest prisons in Ghana. The study was initiated in 2002 by a prominent professor from a medical teaching hospital. After learning about the conditions inside the prison facilities, he formulated a disease surveillance study, with the specific aim of convincing the government to take action. The study revealed a serious outbreak of HIV and Hepatitis C among both inmates and officers, with prevalences much higher than in the general population (Adjei et al. 2006). A questionnaire revealed more engagement in high-risk behaviors, such as illicit drug use, homosexuality and tattooing with shared needles among inmates. The results were disseminated and presented to the Director of Prisons, the Prison Council, the Ministry of the Interior and the MOH.

Interviewees described how the results had played an important role in two policy processes. First, the findings were used in the successful lobby to include prisoners in the national health insurance scheme. When we asked how this 'impact' had come about, interviewees suggested that the ruling political elite had been keen on expanding coverage and demonstrating the success of the new health insurance, especially since elections were upcoming. Second, interviewees described that the results had played a role in the decision to close Ussher fort prison. When we explored this translation process, interviewees explained that, for years, there had been discussions about the use of this old colonial fortress as a prison facility, in which 900 inmates were held in a building suitable for only 300. The study had contributed to this debate by providing data and adding scientific status to some of the arguments which helped the Ghana Bar Association in its successful lobby for the closure of this prison.

Reflecting on case 5

Case 5 showed why the impact metaphor was problematic. Both translation processes –the insurance expansion for prisoners and the closure of Usher prison– illustrated that the 'impact' metaphor was an unrealistic description of how the benefits of research were realized. While in both examples interviewees had described that the results had played an important role and had contributed to action, they had also stressed that these 'impacts' could not be attributed to the research alone, because so many other factors and circumstances had played a role. What we were mapping were thus not 'impacts' that could be attributed to a single source, but 'contributions' that resulted from the distributed agency of multiple actors, factors and evolving circumstances. To better describe what we were analyzing, we decided to drop the 'impact' metaphor and replace it with the more realistic notion of a 'contribution to action'.

A contribution to action

We then set out to describe and operationalize a ‘contribution to action’. To construct a realistic formulation, we analyzed how contributions had been described and asked interviewees at feedback meetings what they considered a ‘contribution to action’. The variety of descriptions followed a similar pattern: when describing a contribution to action, interviewees formulated a story of an evolving world in which the research knowledge played a role. Interviewees found it difficult to describe exactly what role knowledge should play to be seen as contributing to action. Researchers often emphasized that their results should be used in the correct way, while policy makers tended to stress that knowledge could play all kinds of roles, depending on the circumstances and needs. They described that research could provide new insights, lead to new ideas and be useful in designing new policies and practices, but could also be used to support and legitimize pre-existing policies, convince others or undermine undesirable plans. Despite the difficulty of specifying which role knowledge should play to be seen as 'contributing to action', interviewees emphasized that it should play a meaningful role that had some continuity to it. In their examples, such continuity emerged when produced knowledges became part of prevailing concerns, ideas and theories, part of ongoing practices and of policies and their implementation. Interviewees also stressed that it could take some time before knowledges were used and that knowledges were often combined, after which their individual role in action could be difficult to distinguish.

This analysis suggests that 'contributions to action' are varied and must be seen as a process – a process in which knowledge plays a meaningful role in action for health. To map a 'contribution to action', a snapshot is constructed of a process. While these snapshots may prove useful for research evaluation, the evaluation users should always be aware that these snapshots are simplified reifications of precarious and complex processes.

For evaluation purposes, we also sought to develop criteria that could be used to determine whether a described translation process would 'count as' a contribution to action. Based upon the interviews and empirical analyses, we decided on three criteria:

1) the role that knowledge played must be considered meaningful and be agreed upon by at least two of the actors involved,

2) the process of translation to action has to be verifiable and seem plausible to an external analyst, and

3) the role of the results should be ongoing or performed more than six months after the end of the research project.

Case 6: Malaria evaluation and over-diagnosis

To explore the usefulness of our new operationalization, we selected one more research project, which was somewhat similar in size and organization, but in a different context.

Our sixth case showed the usefulness of our operationalization and illustrated how contributions to action are shaped by co-evolving local circumstances. The study had assessed the status of malaria diagnosis in Guinea Bissau, a post-conflict low-income country. The study showed that malaria was substantially over-diagnosed: only 13% of the children clinically diagnosed with malaria had laboratory confirmed parasitaemia (Rodrigues et al. 2008). The results were presented to the National Malaria Control Program, the Director of Public Health and the local WHO representative, amongst others. The study recommended that malaria treatment decisions for children under five should be based on a rapid antigen test and that effectiveness of different treatment strategies should be further evaluated.

Assessment of the research and translation process of case 6 led to the identification of each of the three contribution categories. The PI described several ways through which the research activities had directly contributed. A first contribution was that the study provided an incentive for underpaid health workers to come to work: *'While the study was ongoing, they were there, even till the afternoon. They work at the health centers, but they work here and there, some are driving taxis (…). It was the same thing in the hospital. People were really coming to work"*(PI 8). The research activities also contributed through the equipment and training that was provided and the new practices that were introduced: *"They often do not have thermometers. We provided them with thermometers to measure the temperature. (…) We also trained the lab technicians. We called someone from MRC The Gambia for training in lab technology and in reading the slides. We provided them with reagents and they could do exams like general leukocytes count and measuring hemoglobin.(…) Another thing was safety at the ward. These were basic things about how to deal with blood. Not using gloves, even when they were available. With the study, we tried to change this. We put up posters to remind them. Lancets, not only for the lab, but also for vaccination, were just thrown out like that. We put simple things, like Coca-Cola cans, etc, where they could put the needles in. We also organized a system for collecting these cans. The drivers brought these cans to have them incinerated"* (PI 8). A co-investigator remarked: "*They have asked us to also put the posters in other health centers. They also asked for training for the others, not only for bio safety, but also the training for diagnosis of malaria. (…) We did a one day training course at six health centers"*(CI 81).

The PI described that the results of the study, which showed malaria over-diagnosis, were initially met with disbelief, and only contributed to more research in Guinea Bissau and inspired similar studies in the region. "*In the strategic malaria plan (…)they did not really discuss the issue of over-diagnoses.* (…) *One of the fears was, that if we say that we don't have so much malaria, we will not get the funding"* (PM 82). When a new, much more expensive anti-malarial drug was introduced which poor people had to pay for and the pattern of over-diagnosis was also reported in other countries, local policy makers and the WHO used the results in the new, country-specific malaria strategy: *"So we did agree that in Bissau for children under five, they would recommend the rapid test for deciding on the treatment of malaria. (...) They have included this recommendation in the guidelines (…) If we didn't have this study we wouldn't have changed this"* (PM 82).

The assessment of case 6 had thus led to the identification of several contributions through research activities, contributions to new research and a contributions to action through the use of the results.

Discussion

The aim of this study was to construct an empirically based operationalization of the societal impact of research that is useful for research monitoring and evaluation. Our series of case studies illustrated that the 'societal impact' of research is realized through the distributed agency of multiple actors and the co-evolving circumstances in which they are embedded, and cannot be attributed to a research project as 'source'. Because the 'impact' metaphor suggests a linear translation process that neglects the active role of the user, we chose to replace it with a 'contribution to action'. Our analyses suggested that a contribution to action must be seen as a process – a process in which knowledge plays a meaningful role in action for health.

A process approach implies that contributions are not permanent or final, but precarious and embedded in evolving circumstances. A focus on contributions further implies that the scope of the evaluation should be broadened to include the multiple actors and evolving circumstances that together play a role in realizing the benefits of research. This broadening is important for unravelling how contributions are realized and for learning how their likelihood can be enhanced.

During our study, we learned that the proximal contributions of research can be mapped out well. In each of these translation processes, an actor that was involved in or interacted with the research project, played a role. Their knowledge about these processes helped us to identify and map these contributions. When such a 'linked actor' was not present, we were confronted with the user identification problem, which made it much more difficult to identify and described any emerged contributions.

Because these more distant contributions seem much more difficult to map, we suggest making an analytical distinction between contributions that are realized through linked-utilization and those that emerge from utilization at-a-distance. This pragmatic distinction separates the contributions that can probably be mapped out from those that may be very difficult, or even impossible, to assess. Our case studies illustrate that mapping the contributions that result from linked-utilization is interesting because it may reveal what researchers and others can do to enhance the likelihood that research contributes to action.

One can still try to map the contributions that emerge from utilization at-a-distance. Depending on the case, this will probably require complex and detailed case studies that explore how various streams of research and other societal dynamics co-evolve and result in contributions that emerge in context.

Our results indicate that the developed contribution categories and criteria for 'what counts as' a contribution to action could be useful for analytical purposes. A strength of our approach is the explicit empirical grounding of the operationalization and the contribution categories.

The first category, of contributions linked to research activities, has received little attention in the research evaluation literature. Our results suggest that analyzing what happens in the research context because research is taking place is interesting for two reasons. First, it can reveal underestimated and concealed processes through which research contributes to action, such as capacity enhancement and the introduction of new competences, practices and ways of organizing in the research context. Second, making explicit how the local situation is adapted to produce research results may be essential for understanding the actual meaning of the results and for using or reproducing these results elsewhere.

Learning about the way research contributes to action for health is essential for better employing research and for developing better functioning health research systems (Buxton and Hanney 1996; Smith 2001). Despite calls for a greater emphasis on the societal impact of research, it has proven a challenge to map and enhance this all important aim (Bornmann 2012). Our empirical analyses convinced us to focus on 'contribution to action', rather than the problematic notion of 'impact'. The results suggest that our operationalization of a 'contribution to action' is useful for evaluating research use and for learning how to better employ research for health.

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Chapter 8

Contribution Mapping: a method for mapping the contribution of research to enhance its impact

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Contribution Mapping: a method for mapping the contribution of research to enhance its impact

Introduction

Investments in research for health are mostly made with the aim of ultimately contributing to better action for health. The question increasingly being asked is what the benefits are of the tremendous investments in research, and how the beneficial impact can be enhanced (Cozzens 2010; Pang and Pablos-Mendez 2004; Smith 2001; van Weel 2002; Weiss 2007). Within the health sector, a – albeit fragmented – research domain has emerged that deals with assessing research impact (related terms are: payback, utilization, translation, diffusion, application, implementation, use) (Banzi et al. 2011; Buxton and Hanney 1996; Cameron et al. 2010; El Turabi et al. 2011; Renju et al. 2010; Woelk et al. 2009). Various conceptual frameworks and methods have been developed and, increasingly, empirical studies are reported (Banzi et al. 2011; Canadian Academy of Health Sciences 2009; Court and Young 2003; Estabrooks et al. 2009; Guindon et al. 2010; Hanney et al. 2004; Mostert et al. 2010; Yazdizadeh, Majdzadeh, and Salmasian 2010). While important progress is being made, the developed methods struggle with operationalizing the dependent variable 'impact', attributing impact to individual research projects and identifying the users of research (Canadian Academy of Health Sciences 2009). In addition, the developed methods are primarily used for accountability purposes: showing impact to external funders, instead of learning how to better employ research and enhancing the realization of beneficial contributions.

In this article we will describe *Contribution Mapping*, a novel approach to research monitoring and evaluation that focuses on processes and contributions (instead of products and impacts). While *Contribution Mapping* can be used for accountability purposes, it is especially designed to assist those who seek to better employ research to contribute to action for health. We use the broad term 'action for health' as we want to include all activities that are somehow related to health (e.g. contributions to an insurance policy, better practices and technologies, organization of care).

Research does not function as a cannon that shoots knowledge into the world of action, where the targeting and force of the knowledge determines its 'impact'. The productivity of research for health ultimately lies with the users who have to pick up and combine knowledges (in the plural) and use them for their own purposes, in a complex world full of ongoing processes (Latour 1987). The subsequent changes in action achieved are the result of the distributed agency of multiple actors and a confluence of actions, knowledges and circumstances. Such changes are part of evolving, complex and open systems in which change is continuous, non-linear, multi-directional and difficult to control (Kok, Rodrigues, et al. 2012). The consequence is that achieved changes cannot realistically be attributed to a single research project as 'source'. The utilization of research results is often diffuse: it contributes to one's view of the world, to signals being taken into account, in addition to the more recognizable production of specific knowledge with an instrumental function (Rip 2001). People often do not realize where they get their knowledge from and may not be able to explain what role knowledge played in their behaviour. A related challenge is that the pathways from research to 'impacts' are very diverse: sometimes short and traceable, but often long, through multiple reservoirs, and via utilization at untraceable times and places. Though there might be a 'trail' from the cowpox vaccination study by Jenner at the end of the 18th century, to the global eradication of smallpox in 1977, it seems impossible to trace it and erroneous to attribute eradication to Jenner's study as source.

The attribution problem, challenge of identifying users and the diffuseness and diversity of research & action pathways make an assessment of the ultimate 'impact' of a research project problematic. Therefore, *Contribution Mapping* focuses on the actors that are involved in, or directly interact, with a research project and aims to assess contributions instead of impacts. A contribution to action refers to the activities which turn a novel combination of knowledges into a 'going concern' as a part of practices, a component in successful innovation or an element in decisions and their implementation.

An additional drawback of focusing on ultimate impacts is that this does not provide the kind of information and feedback required by those involved in a research & action pathway to improve their performance. Even if we could trace smallpox eradication in 1977 back to the work of Jenner, that would not indicate what he could have done differently to enhance the use of his results. To use *Contribution Mapping* for learning and improvement purposes, it has to provide stakeholders with actionable knowledge about deliberate efforts that enhance the likelihood that research contributes to action. In order to refer to such efforts, we introduce the notion of *alignment efforts* (alignment emphasizes that accommodation can take place on the side of research and/or on the side of action, instead of a one-way research to action dynamic). Some examples of *alignment efforts* are engaging policymakers in research priority setting, writing dissemination plans and engaging patients in the interpretation of results (Davis and Howden-Chapman 1996; El-Jardali et al. 2012; Innvaer et al. 2002; Kok and de Souza 2010; Lavis et al. 2002, 2009; Saunders and Girgis 2010; Viergever et al.

2010). Such efforts stimulate those involved in a research & action pathway (e.g. researchers, policy makers, end-users) to anticipate and make adaptations that increase the likelihood that contributions to action are realized. Despite the fact that the interest in *alignment efforts* is increasing, it remains unclear if and how these efforts ultimately increase the likelihood that research-related contributions are realized. To our knowledge, a method for assessing the relation between *alignment efforts* for new research projects and eventually realized contributions does not exist. The aim of this study is therefore to design a method that can be used to map research-related contributions and relate these contributions to *alignment efforts*. In developing *Contribution Mapping*, we build upon insights from existing methods, such as the Payback framework and enrich this with a perspective on research and utilization that is informed by social studies of science, insights into the evaluation of change in complex open systems and our own experiences with trying to assess research 'impact' in various countries (Bhola 2000; Buxton and Hanney 1996; Court and Young 2003; Earl, Carden, and Smutylo 2001; Kok, Rodrigues, et al. 2012; Latour and Woolgar 1979).

This article continues by laying out our perspective on research and knowledge utilization, and categories of research-related contributions. We then explore explanations for research utilization in the literature and identify nine specific *alignment efforts*. This is followed by a description of the stages, steps and procedure of *Contribution Mapping*. In the final section we reflect on the developed method and on the way it could be used to better employ research to contribute to an envisioned future.

Perspective on utilizing research knowledge

The first step in designing *Contribution Mapping* is to sketch a perspective on how knowledge is produced and utilized and how research-related contributions are realized. The perspective below is inspired especially by social studies of science and actor-network theory (Callon 1986; Latour 1987, 2005; Latour and Woolgar 1979; Law 1994).

We describe research broadly, as an organized search process in which knowledge is designed (Latour and Woolgar 1979). To produce a new knowledge, elements such as local observations, test results, theories, concepts and circumstances, are aligned into a configuration. This process continues with designing a knowledge claim that is to stand in for (and partly blackboxes) the aligned elements (Latour and Woolgar 1979). The produced knowledge claim can be added to, and stored in, knowledge reservoirs. These reservoirs can be explicit and contain codified knowledge, such as scientific journals or databases, but can also be more diffuse in nature, such as the knowledge available in a group of people. Knowledge can also be embodied in innovative artefacts, such as an MRI-scanner or new medicine. Knowledge always takes a material form, it can never exist by itself, and work is required to maintain and transport it (Latour 1987). It is a configuration that continuously has to be remade.

In the literature on knowledge utilization in the health sector, there has been limited attention for the role of the users of knowledge and the evolving worlds in which they operate. Users may have different interpretations of knowledge and existing arrangements and ongoing change activities in their world may constrain or enable utilization (Callon 1986; Kok, Vaandrager, et al. 2012; Latour 1987).

The next step in sketching our perspective is therefore to characterize that evolving world. The world has a certain order that sustains itself, without fully determining the future and is at the same time changing and full of ideas for change (Deuten and Rip 2000). That order of the world and the changes that occur are socio-material (Law 1994). The architecture and equipment of a hospital, the design of a wheelchair, the genetic code of a virus, the composition of a vaccine, the infrastructure for reaching patients: they are materialisations of a specific way of doing and embody a specific institutional (or social) code or script (De Laat 2000; Rip 2009). In turn this material order structures the practices for health and its societal embedding: social relations between a health worker and a patient, between hospitals, insurance companies and researchers and the wider social environment such as the pharmaceutical industry, government, trade agreements. In such a socio-material order, physical as well as institutional boundaries are created and maintained that enable some developments and constrain others (Law 1994).

While the social and material order sustain each other and provide some continuity, there is also ongoing change, that is full of ideas for change and implementation strategies of a variety of involved actors (Deuten and Rip 2000). A novel treatment that is implemented, scripts in new technologies, evolving viruses, innovative buildings that challenge social codes and new policies, visions and strategies may work in different directions and gain their own kind of momentum. They interact with the existing socio-material order and the embodied scripts, shared stories and visions that provide direction. In this evolving mosaic of socio-material ordering and multiple ongoing change activities, knowledge utilization takes place.

Users and the world in which they operate, play an important role in articulating knowledge and realizing its productivity. Callon provides a perspective to analyze this embedded role (Callon 1986). This perspective begins with the idea that actors are constantly formulating and pursuing implicit or explicit scenarios about the future, with the intention of shaping this future. In these actor-scenarios, other people, technologies, knowledges, artifacts and institutions, among other things, are assigned roles as characters in a 'fictitious script' about the future (De Laat 2000).

These actor-scenarios depend on what is already present in the world of the actor who 'narrates' the scenario and on what he needs. Depending on the forces at play in a scenario and the situation in which a scenario is presented, there can be a particular, sometimes very explicit, need for knowledge. From this action perspective, knowledge can play a role in all kinds of ways. The knowledge that is introduced into a scenario can confirm, support or strengthen elements of an evolving scenario or introduce new elements. Knowledge can also be used to undermine the actor-scenarios of others. Regardless of the role knowledge plays, its use can always be analyzed in terms of evolving actor-scenarios.

Knowledge utilization can be described as incorporating knowledge into an actor-scenario as a means of contributing to its strength and scope. By introducing knowledge from outside, actors can decrease the amount of complexity they have to reduce themselves. Furthermore, it allows them to incorporate things into their scenario that are not present in their own world (e.g. a new innovation, an incidence number or new diagnosis based on controlled observations, scientific status). The introduction of knowledge can strengthen an actor-scenario and enable an actor to deal better with complexity and uncertainty. The addition of new knowledge can increase a scenario's robustness against attacks from others, but may also make it a bit more complicated.

Research knowledge aims at a certain generality, which makes it interesting and applicable in other cases elsewhere. Utilization, however, is concrete and locally specific. To utilize knowledge and realize a contribution, research knowledge has to be translated. This translation has a cognitive component, which involves translating to a form and content which is applicable, and a social component, which involves translating from the locus of production or storage, to the locus of utilization which has to be rearranged to bring knowledge in (Rip 2001). The realization of an actor-scenario requires work, especially when large changes in a local situation are needed. All kinds of efforts may be required to ensure that the actors in a scenario perform their assigned roles. Still, the scenario may unfold differently than originally intended: people may follow their own plans, technologies may not function as expected, a virus may become drug resistant or institutions may resist change. The actors, presented as characters in one scenario, may also make a counter move (Callon 1986). To resist the assigned role, they can start telling and initiating an alternative scenario. There may be further reactions, other actors and background resources may be mobilized and further actors may start to tell and pursue actor-scenarios themselves. Ultimately, the scenario-building activities lead to new relationships and action, whereby something actually changes. At the same time, this change is accompanied by constantly new actor-scenarios and their interactions. There will be a net effect with an overall direction of change. Not because there is consensus, but because the elements (actors and links) in the scenarios have become entangled (Deuten and Rip 2000; Rip 2009). The dynamics lie in the interaction between the actor-scenarios and the significance this has for changing worlds. Together, these scenarios, sometimes explicitly, shape the evolution of our world and the use of knowledge in it.

From this perspective follows that the agency in knowledge utilization is distributed between a number of actors that play a role in a scenario (e.g. the user, the knowledge, other human and non-human actors) and actors in interacting scenarios. Eventual change cannot be attributed to a single source. What we can do is try to analyze the roles played by the actors in the scenario and trace if and how knowledge was brought in and turned into a matter of concern.

Linked actors* and *key users

In the study of research and utilization, we would ideally follow all relevant actors, explore all the actor-scenarios put forward and trace all routes that knowledge travels. In reality the dynamics of knowledge utilization and limited resources available for such analyses make this almost impossible. For practical and analytical reasons, we need to prioritize the actors that are followed and utilization processes that are explored.

The actors that are followed are selected in two steps. First, we focus on the actors that shape the research process and the initial route to utilization. This group of actors comprises the investigators and those with whom they interact for the research project, the so-called *linked actors*. Examples of *linked actors* are those asked to give feedback on a research proposal, participants in a research project, practitioners engaged in interpreting the findings or policy makers with whom findings are discussed. Together, the group of investigators and *linked actors* possesses a number of characteristics which makes it both interesting and practical to focus on them. This group includes those who can anticipate utilization during knowledge production and those who are most aware of the results. Another advantage of focusing on *linked actors* is that they can usually be identified.

Within the group of involved and *linked actors*, we subsequently try to identify the most interesting potential users, the so-called potential *key users* (from the perspective of action for health). The identification of potential *key users* requires a certain interpretation of the meaning of the research project, how the results can be used and who the relevant influential actors are in action for health. The selection of *key users* will influence the results of *Contribution Mapping*. The selection process should therefore be transparent. Engaging stakeholders in the mapping process in this selection process may help in making the most appropriate selection and increase the acceptance of the results.

To identify *key users*, we search for actors that take a central place in relevant networks (in action for health) and seem most capable in employing research knowledge to contribute to action for health. In health care, these actors may be influential policymakers, representatives of patient groups, opinion leaders or others who seem capable of creating and realizing influential scenarios in which the produced knowledge may be useful.

The focus in Contribution Mapping is on the potential *key users* among the group of investigators and *linked actors*. Depending on the specific purpose of a mapping exercise, further utilization through other actors who have not been 'linked' can also be explored. This again requires the selection of potential key users who will be interviewed. In identifying these actors, a forward approach can be taken, in which the routes of knowledge are traced, by interviewing actors that interacted with the linked actors, for instance. In a backward approach, a specific group of actors is selected (e.g. relevant policymakers at the MOH) and they are interviewed about utilization.

The three-phase process model

In the second step in developing *Contribution Mapping*, we combine the perspective on research and utilization and the idea of *linked actors* and *key-users* with the existing models in the literature, which results in a three-phase process model (see Figure 1). Each of the three phases in the process model indicates typical activities, which may be linked through more diffuse 'reservoirs' at a collective level. The demarcation of the three phases is made for practical purposes. In reality, activities, such as articulating the research question or narrating of actor-scenarios, may temporarily stabilize and continue in other phases. To demarcate between the three phases, we have identified two specific events in the research and contribution pathway.

Figure 1: The three-phase process model

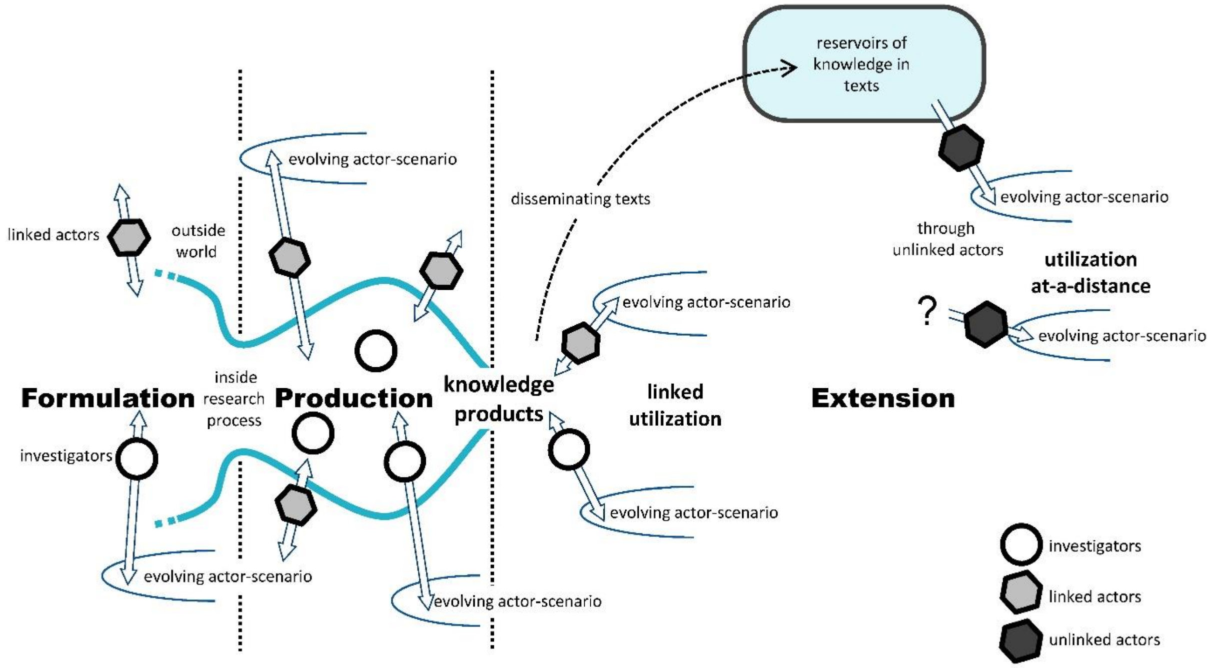

Figure 1. In the graphical representation of the three-phase process model, the two vertical lines separate the three phases. The search process narrows when a research proposal is formulated. At the beginning of the production phase, the search processes may widen again, before they are narrowed and the knowledge products are realized. During the production phase, there may already be some dissemination and uptake of emerging knowledges. After the knowledge products have been realized, the extension phase commences with dissemination and utilization in evolving actor-scenarios. Investigators are inside the research process, while *linked actors* are outside, but able to interact with the process. Both investigators and *linked actors* can connect the research process to evolving actor-scenarios.

The first phase is the **formulation phase**. In this phase the activities are generally oriented towards directing search processes and mobilizing resources, and the formulation, selection and funding of specific research projects. Based on promises, expectations and negotiations, dominant ideas emerge about possible research directions and priorities. Formally set research agendas, the commissioning of research and ad-hoc prioritization may involve efforts to align research and action (e.g. when health workers and patients are engaged in priority setting). Researchers may also seek alignment by anticipating perceived needs, or by engaging potential users in the formulation of research proposals. The selection of research proposals and funding of research projects provides another opportunity for those involved to attune research and action. The moment that the investigators become aware that a research project is being funded is used to demarcate the formulation phase from the next phase.

In the **production phase,** the activities take place to realize the knowledge products. This may involve an array of activities. At the research site(s), the preconditions have to be realized to make research possible. This may include training staff, adapting organizational practices, acquiring equipment, establishing relations with policymakers, recruiting participants, etc. These activities are interesting because they can be a first contribution or provide the foundation for later utilization. To produce new knowledge, elements, such as controlled observations, theories, statistical analyses, participants, computer outputs, discussions, etc, are mobilized and aligned into a configuration. Subsequently, a new knowledge claim is designed that is to 'stand in' (or 'speak') for these aligned elements. The investigators and others involved may learn something during the research process, and the new knowledge may become part of the knowledge they possess.
Even before the formal knowledge outputs are designed, there may be uptake of emerging knowledge in practice, and the new relations and changes made at the research site(s), may contribute to action (Woelk et al. 2009). The moment that the investigators determine what their findings are is used to demarcate the production phase from the knowledge extension phase.

In the **knowledge extension phase,** the activities are aimed at making knowledge available to potential users and initiating and stimulating utilization. The investigators, *linked actors* and/or others may disseminate the produced knowledge and initiate and stimulate utilization. Through presentations, targeted dissemination and publications in popular media and scientific journals, the new knowledge may be added to diffuse and more explicit reservoirs of knowledge. The various and overlapping knowledge reservoirs are accessible to different potential users in different ways, in terms of their absorptive capacity and competencies for utilization.
Utilization depends on actors that grab knowledge from these reservoirs and combine and use them for their own purposes, in a complex world full of ongoing processes. Investigators*, linked actors* or unknown others may initiate and stimulate the activities which turn a novel combination of knowledges into a going concern as a part of practices, a component in a successful innovation or an element in decisions and their implementation. This is how the promised contributions are actually realized.

Contribution categories

Based on the above perspective and the three-phase process model, four categories of research-related contributions can be distinguished. The first category pertains to the change in the ability and actions of the investigators and *linked actors* that results from the research activities. The second category contains the knowledge products that are added to reservoirs of codified knowledge and the research domain. The third category contains the contributions to action through utilization of the knowledge produced by the investigators or *linked actors*. The fourth category contains indications of contributions realized through utilization by non-linked actors. Utilization at-a-distance is separated from linked utilization because the former is often much more difficult to assess.

Change in abilities and actions of involved and *linked actors*

This category comprises changes in the investigators and *linked actors* that are related to the *activities* of research. The *activities* that research comprises may lead to new competences, behaviours and relationships among the involved and *linked actors*. Research *activities* may also lead to the introduction of new practices, protocols and the identification or awareness of problems at the research site.

Contributed knowledge products

This category comprises the realized knowledge products that are added to reservoirs of codified knowledge and to the domain of research. This includes scientific publications, publications in other media and new research projects, protocols, methods and equipment (e.g. publications, new research methods, better targeting of future research).

Contributions through linked utilization

This category comprises contributions to action, through utilization of the produced knowledge by the investigators or *linked actors*. The produced knowledge is added to an evolving actor-scenario that is at least partly enacted. The new knowledge becomes part of a novel combination that is turned into a going concern as a part of practices, a component in successful innovation or as an element in decisions and their implementation.

Indications of utilization at-a-distance

This category comprises contributions to action through utilization of the knowledge produced, by actors that are not involved in, or linked to, the research project. These contributions are described tentatively as indications of utilization at-a-distance as they may be difficult to identify and triangulate.

Deriving *alignment efforts* from explanations for research utilization

The next step in the development of our method is identifying specific efforts during research formulation, production and extension which aim to enhance the contribution of research to action. These so-called *alignment efforts* are defined as deliberate efforts aimed to increase the likelihood that a contribution to action is realized. By assessing both the presence of *alignment efforts* and the realized contribution to action for each research project, we can analyze the extent to which *alignment efforts* are related to specific contributions (e.g. engaging policymakers in proposal formulation increases the chance that research is used in policy making).

To identify a set of interesting *alignment efforts*, we searched extensively for publications of empirical studies that 1) take research processes as a starting point, 2) simultaneously analyze various *alignment efforts* and 3) relate these to utilization. While we found several studies that focus on characteristics of the users of research and their context (Amara 2004; Cummings et al. 2007; Estabrooks et al. 2007; Gano, Crowley, and Guston 2006; Innvaer et al. 2002; Kitson et al. 2008; Landry, Lamari, and Amara 2003; Wehrens, Bekker, and Bal 2011), the characteristics of research products and interactions between stakeholders (Anderson, Ciarlo, and Brodie 1981; Caplan 1979; Gano et al. 2006; Lester 1993; Lomas 1997; Sabatier 1978; Webber 1987; Weiss 1981), we found no studies that matched the three search criteria. We did find three studies in which various explanations for research utilization were simultaneously considered (Amara 2004; Gano et al. 2006; Landry et al. 2003). These three studies use a similar theoretical framework that describes two categories of explanations of research utilization: engineering explanations and socio-organizational explanations. In these frameworks, the latter category is divided into three sub-categories: organizational interest explanations, ‘two communities’ explanations and interaction explanations. We have chosen to build upon these studies because they provide a detailed theoretical foundation and an empirical example.

Engineering explanations

Pioneering studies aiming to explain research utilization focused on so-called engineering explanations, i.e. the technical merits (or instrumental value) of the knowledge as the key for utilization (Anderson et al. 1981; Caplan 1975; Conner 1981; Knorr 1977; Weiss 1981). Landry and colleagues divide these engineering explanations as focusing on two different clusters of dimensions: research findings (validity, content attributes, compatibility, complexity, observability, trialability, reliability, divisibility, applicability, radicalness) (Dearing 2004; Edwards 1991; Weiss and Bucuvalas 1980) and the type of research (quantitative, qualitative, basic, theoretical, applied, research domains and disciplines, etc) (Landry, Amara, and Lamari 2001; Rich 1997). While there is prima facie plausibility that such factors will have effect on utilization, several studies have shown that these engineering explanations have limited explanatory power (Cummings et al. 2007; Dobrow, Goel, and Upshur 2004; Huberman 1994). A reason for this might be the indeterminate directional influence of these factors. Quantitative studies may be influential because the findings seem more concrete, but may also be too technical and provide limited direction to policymakers, for instance. Because past operationalizations of the engineering explanations have led to ambiguous predictions and results, their usefulness in exploring the contribution of research to action seems limited.

Socio-organizational models

The socio-organizational models of research utilization focus on the processes and interactions during a research project and the relations with context, instead of the intrinsic atomistic characteristics of research. These models can be further divided into three – partly overlapping – subcategories that emphasize different aspects: 1) organizational interest, 2) 'two communities' and 3) interactions.

The organizational interest explanation predicts that the *needs* of organizations and *features* of organizations (e.g. policy domain, organizational structure and role, positions) shape how actors utilize research, with the corollary that the utilization of research increases if it is oriented to the needs of end-users (Frenk 1992). Empirical studies have shown that the use of research increases as users consider research pertinent, as research coincides with the users' needs, as the users' attitude is to give credibility to research and as results reach users at the right time (Gano et al. 2006; Harpham and Tuan 2006; Landry et al. 2001, 2003). To orient a research project to the needs of users, these users have to be identified and their needs have to be articulated. One way of doing this is engaging potential users in setting research priorities (Gonzalez-block 2004; Ranson and Bennett 2009; Redman-Maclaren et al. 2010). These priorities then have to be taken into account, during the formulation and selection of research proposals. Research can also be directly linked to a question of a specific organization, up to being commissioned by it. An advantage of directly linking research is that the specifics of a question can be taken into account including the framing of the question and specific windows of opportunity in the decision-making context (Anderson et al. 2008). Another direct way to link research to action is when a person involved in policy or practice is involved as one of the investigators (e.g. technical advisor, board member) (Theobald et al. 2011). Actors with this kind of a double role can attune the research project to needs in the action domain, but also prepare the ground for utilization in the action. The potential of such a double-role actor depends on his capability to create alignment between research and action.

The 'two communities' explanation predicts that the cultural difference between the research community and the policy community is the main reason for low levels of research utilization (Caplan 1979; Snow 1964). This explanation has a long history and originally focused on differences in norms and values and language of communication between science and policy. More recently, other aspects have also been grouped under this explanation (Brownson et al. 2006). While there are real differences between the domains of research and policymaking, detailed investigations of research and policy have rendered the distinction between these two communities less meaningful. Viewed up close, science turns out to look a lot like other social institutions, full of norms, beliefs, ideologies, practices, networks and power and deeply engaged in the production and management of social order (Miller 2001). Similarly, policymaking processes rely deeply on the production of matters of fact to acquire and retain legitimacy. In addition, there is the tremendous diversity within the research (applied social science, quantum physics) and policy (formal legislation, technical guidelines) domain. For our method we are not just interested in the domains of 'research' and 'policy', but also in the 'health' domain (which can also be policy actions). An additional insight is that policy is not made in one place at the apex of society (or at the top of the research and health systems), but at various levels, including by health practitioners who function as 'street level bureaucrats' (Lipsky 1980). Instead of dealing with two communities, we have to deal with three partly overlapping and stratified domains. Efforts to deal with the differences between these domains traditionally focus on literally translating research results to a format and language that is deemed suitable for policy and practice, providing more context specific recommendations and more targeted disseminating to potential *key users* in action.

Most recently, the explanations of research utilization focus on the interaction between researchers and the users of their knowledge products (Davis and Howden-Chapman 1996; Innvaer et al. 2002; Lavis et al. 2002). The interaction explanation predicts that the utilization of knowledge depends on the various interactions occurring between researchers and users. Interactions can lead to trust, mutual learning and the anticipation of utilization on both the research and action side. The effect of interactions depends on the capability of actors to align research and action and on the phase that a research project is in. Interactions during proposal formulation may lead to adaptations of the study design, while interaction during the interpretation of results may help to frame them in a decision-making context.

Analyzing ***alignment efforts***

In the previous section on explaining research utilization, various *alignment efforts* are described, such as engaging potential users in setting research priorities, formulating research and interpreting results, employing *double-role actors* in research and disseminating research results to potential *key users*. Depending on the aim of the mapping exercise, involved actors may prospectively select specific *alignment efforts* on which to focus the analysis. Another approach is to try to retrospectively analyze which *alignment efforts* have played a role in realizing contributions. *Alignment efforts* may have a combined and context-dependent effect and different aims may require different efforts. In-depth case studies may be especially useful in analyzing how *alignment efforts* enhance contributions in context. It may also be interesting to conduct multiple case studies and search for patterns in the relation between *alignment efforts* and contributions.

In Table 1 nine *alignment efforts* are described as examples. The presence and functioning of these efforts can be explored for each assessed research project. When a large number of projects is assessed, ordinal scales can be developed to score the presence of each *alignment effort* in the mapped projects. These scores can then be used for the identification of patterns in the relation between *alignment efforts* and realized contributions.

Contribution Mapping

In the previous sections we have described 1) an explicit perspective on research and utilization, 2) the three-phase process model, 3) categories of research-related contributions and 4) explanations for research utilization and related *alignment efforts*. In this section we describe the structure and procedures of *Contribution Mapping*.

Stages in ***Contribution Mapping***

There are four stages and ten steps to *Contribution Mapping* (see Figure 2). For each research project

that is assessed, all ten steps are followed and both a process map and a contribution map are developed. In the first stage of *Contribution Mapping* (step 1-4), the investigators of a research project are interviewed to start developing a process map. The process map is iteratively developed throughout *Contribution Mapping* and includes the main activities for the three phases, the *linked actors* and potential *key users*. The first stage ends with a first estimation of the contributions, as perceived by the investigators, which are added to the contribution map. In the second stage, potential *key users* and other informants are interviewed in order to trace, explore and triangulate possible contributions. In the third stage, the *alignment efforts* are analyzed. Preliminary results are shared with the stakeholders for feedback and validation. After inconsistencies are clarified or described, the results are shared with stakeholders for learning, improvement and accountability purposes.
The general interview strategy in *Contribution Mapping* is to start with asking open questions and continue by probing and providing more specific examples.

Stage 0: Joint preparation

Needs, expectations, purpose, values, roles

The aim of step one is to explain the process of *Contribution Mapping* and jointly clarify needs and expectations, the purpose of conducting *Contribution Mapping* and the roles of those involved. Why is *Contribution Mapping* employed, and what is expected from it? What is the rationale that connects the mapping of research contributions to some higher purpose? Who are involved and who are expected to learn or benefit from the results? In what context is the assessment conducted? *Contribution Mapping* may be employed for various purposes, such as accountability to investors, learning how to better employ research and improving the extent to which beneficial contributions are realized. Table 2 provides an indication of how the approach can be attuned for each purpose.

In *Contribution Mapping*, we do not assume that evaluation is value-free. The process is intended to be participatory and stakeholders are invited to bring their ideas, perceptions, frames and values into the mapping exercise and take on an active role. The roles and functions of those involved in the evaluation are not predetermined and should therefore be clarified at this stage. Depending on the situation and purpose of *Contribution Mapping*, a useful division of tasks and responsibilities has to be decided on.

Figure 2: Stages and steps in *Contribution Mapping*

Stage 0: Joint preparation
- Needs, expectations, purpose, values, roles

Stage 1: First process and Contribution Mapping
Step 1. Introduction
Step 2. The research team
Step 3. Three-phase process mapping
- **Formulate phase**
  - Vision, aims, activities, actors, alignment
- **Production phase**
  - Activities, actors, alignment, main results
- **Knowledge extension phase**
  - Projected contributions
  - Initiated dissemination and utilization
  - Dissemination and utilization by *linked actors*

Step 4. First Contribution Mapping
- **Change in involved and *linked actors***
- **Knowledge products**
- **Contributions through linked utilization**
- **Indications of utilization at-a-distance**

Stage 2: Exploring and triangulation contributions
Step 5. Interviewing potential *key users*
Step 6. Triangulating contributions

Stage 3: Co-producing and sharing results
Step 7. Analyzing alignment efforts
Step 8. Inviting feedback and validation
Step 9. Clarifying and describing inconsistencies
Step 10 Sharing results for learning, improvement and accountability

Stage 1: First process and Contribution Mapping (step 1-4)

The main activity of stage one is interviewing the investigator(s) of the research project that is assessed. This interview is best held with the principal investigator and, if possible, another investigator involved. This stage ends with a first estimation of research-related contributions, which is based on the perceptions of the investigators.

Step 1. Introduction

The aim of step one is to introduce *Contribution Mapping* to the investigator(s) that are interviewed and lay out the three-phase process map. To prepare for the process mapping, documents, such as research proposals, reports and publications, are read. The interview with the investigator(s) starts with explaining the purpose and stages of *Contribution Mapping* and structure of the interview. After the emphasis on actors and processes is explained, the three-phase process map is introduced (formulation, production, extension). A timeline is drawn and the two demarcation moments are identified and added to the timeline.

Step 2. The research team

The aim of step two is to map and characterize the research team and identify potential *key users* amongst them. The research team consists of the enlisted investigators and others professionally involved in the study (e.g. research assistants, health workers). For each investigator, age, background, research and policy experience, roles in the project (in what activities involved) and formal and informal roles in relevant decision-making processes are described (e.g. in advisory committees, policy processes). This information provides insight into how the investigators may link, through their past and current functions, roles and actions, the research process to relevant decision-making processes and thereby enables the identification of potential *key users*. Next, the others who are professionally involved in the study are described (e.g. manager of involved institute, nurses, medical doctors, research assistants). If it appears relevant, further questions are asked to establish how they were involved and if they are likely to function as *key user*.

Step 3. Three-phase process mapping

The aim of step three is to start filling in the process map, from the perspective of the investigators. For each of the three phases (formulation, production, extension), the main activities, *linked actors* and potential *key users,* as well as *alignment efforts,* are identified. (As the focus is generally on linked utilization, the *key users* among the investigators and *linked actors* are selected first. Second, other *key users* can be identified to explore utilization at-a-distance).

Formulation phase

Vision, aim, activities, actors, alignment

First, the vision underpinning the research project is explored. Why did the investigators initiate this research project? (e.g. to inform policymaking, publish high impact articles, contribute to specific changes). After clarifying the vision, the next step is exploring how the research project aimed to contribute to this. What was the aim of the research project?

The origin and formulation of the project is explored. Where did the idea for the research question come from? Who was involved in formulating the research proposal? Who were considered potential *key users*? Was the proposal discussed with potential users? If so, these are added to the process map as *linked actors*, and the role and influence of these individuals is explored to determine if they are potential *key users*.
The influence of interactions with potential users is explored. Was the research proposal adapted as a result of interactions? Did the potential users initiate any actions because of awareness of the research formulation (e.g. postpone decision-making)? Finally, specific *alignment efforts* can be further explored (e.g. Was the proposal attuned to a priority of a research agenda?).

Production phase

Activities, actors, alignment, main results

The process mapping continues with the production phase. Again, the aim is to get an overview of the main activities, *linked actors* and potential *key users*, as well as the selected or unexpected *alignment efforts*. What were the main activities and who was involved? Have new actors been linked to the research process through engagement or interaction? If so, the role and influence of new *linked actors* is explored to identify potential *key users* amongst them. The influence of such interactions is explored to determine if this has led to new alignments. Were any adaptations made to the research process as a result of these interactions? The mapping of the production phase ends with a description on the main results. The investigators are asked to describe the main results with minimal interpretation, as they would in the result section of an article.

Knowledge Extension phase

Contributions expected by the investigator

The exploration of the extension phase starts with asking the investigators to describe the *meaning* and *consequences* of the main results for policy, practice and health. How should the results be picked up and utilized, and who should take up this role? The investigators are thus asked to sketch their actor-scenario in which the produced knowledge has a role and *key-users* are identified.

Initiated dissemination and utilization

Extension efforts may include one-way dissemination, but also more interactive efforts to initiate and stimulate utilization.

First, the interpretation of the results is explored. Have any previously *linked actors* been engaged in interpreting and framing the results? Have new actors been engaged in interpretation and thus become linked to the research project? Are there any potential *key users* among them? Second, the dissemination is explored. How and when were the results disseminated? Did this involve interaction that has led to new *linked actors* and potential *key users*? Were the results published in scientific journals, popular media and/or on the internet? Has the data been made available for use by others?

Third, the utilization that is initiated by the investigators is explored. Did the investigators try to use the results themselves in action processes? They might have a function in action (e.g. a health director conducting research) or take on such a role and start to tell and create new actor-scenarios. Did the investigators engage new actors to initiate utilization? (These newly engaged actors become *linked actors*). Where there any potential *key users* among them?

Dissemination and utilization by linked actors

In a similar way, a first exploration is made of extension through the *linked actors,* especially the potential *key users*. Are the investigators aware of any efforts by *linked actors* to further disseminate the results or initiate utilization?

At the end of step three, a first process map has been made around a timeline, with for each phase a summary of the main activities, the *linked actors*, potential *key users* and the *alignment efforts*. This map provides a transparent overview that can be further explored, discussed, added to, modified and triangulated.

Step 4. First Contribution Mapping

The aim of step four is to start identifying possible research-related contributions and tentatively add them to the contribution map. We begin this process by asking the investigators about the realization of contributions in which they were involved. We then ask the investigators to indicate routes towards contributions through *linked actors* and possible others. Each of the four contribution categories is briefly explained to the interviewees, after which the perceived contributions are explored and described one by one.

Change in involved and linked actors

The first contribution category comprises changes in the involved and *linked actors* that are related to the *activities* of research. First, research-related changes in the investigators are explored. Have they developed new skills, competences and relations as a result of the research activities? What have they learned and has this changed their behaviours and actions? Subsequently, similar questions are asked regarding the other involved or *linked actors* or groups (e.g. research assistants, health workers, participants, policy makers).

Are the investigators aware of changes in competences, behaviours, relationships and actions in any these actors or groups? This provides an indication of changes in these other actors.

Knowledge products

The second contribution category comprises the knowledge products that are added to reservoirs of codified knowledge and the domain of research. Based upon the described dissemination activities, the investigators are asked to which reservoirs the produced knowledge has been added. This may include publication of the results in scientific journals, the local media, internet, etc, but also research data that is made available to others. Finally, the investigators are asked to describe other contributions to the research domain, such as methods that are used by others, better targeting of new research, newly funded research projects, etc.

Contributions through linked utilization

The third category comprises contributions through linked utilization, which refers to utilization of the produced knowledge through the investigators or *linked actors*.

The investigators are asked to describe if and how the produced knowledge has been used to contribute to action, and by whom. Interviewees are asked what role the new knowledge played in evolving actor-scenarios. Some interviewees may have the tendency to overestimate the contributions, while others may downplay the use or role of the results. To increase the reliability of the responses, the interviewees are encouraged to describe all the potential contributions. The process map, which includes the potential *key users,* is used to identify potential contributions (e.g. Has this policymaker that was engaged in interpretation used the results?). These contributions are explored one by one through a critical dialogue, in which the process map is used to relate them to specific actors, events, activities, *alignment efforts* and other ongoing processes. This provides an overview of the utilization of the results by the *linked actors*, as perceived by the investigators.

Indications of utilization at-a-distance

The fourth contribution category is utilization by actors that have not been involved in, or have not interacted with, those involved in the research project. This utilization at-a-distance results from external actors that take codified knowledge from a reservoir, without interaction with the investigators. Utilization at-a-distance can only be described if one of the investigators, *linked actors* or other stakeholders are aware of it and describe it to those involved in *Contribution Mapping*, or when knowledge used in texts or artefacts can be traced back to a research project. Utilization at-a-distance is not the focus of *Contribution Mapping*, as it is difficult to describe, trace and triangulate. Depending on the goals of those involved, indications of utilization at-a-distance can be explored and described.

Stage 2: Exploring and triangulating contributions (step 5-6)

In the second stage of *Contribution Mapping*, the main activity is interviewing potential *key-users* and other relevant informants to further explore and triangulate utilization. We focus below on contributions through linked utilization, but step five to ten are similar if the focus is on other contribution categories.

Step 5. Interviewing potential *key users*

The aim of step five is to explore and, if possible, triangulate contributions among potential *key users*. Based on the process map and described contributions, a selection is made of the most interesting potential *key users,* and they are approached for an interview. The interview starts with questions about their characteristics (background, experiences in research and policy, formal and informal roles in related decision-making) and continues with their interactions with the research project and awareness and interpretation of the results. Next, they are asked if, how and why they have been involved in utilization. Interviewees are asked how new knowledge was brought into evolving scenarios and what role it played. Utilization is further explored through a critical dialogue in which an attempt is made to trace pathways to specific actions, times and places. The utilization that others have described (in step 4 or 5) is then shared and the interviewee is asked to give his or her perception of this. If it seems useful, the *key user* is asked to identify others who may further describe if, how and why results were used in evolving scenarios.

Step 6. Triangulating contributions

The aim of step six is to further explore utilization and, if possible, triangulate claims about contributions. Key informants are selected based upon their knowledge about the scenarios in which results may have been used (these key informant may be others involved or *linked actors*). The interview starts with the characteristics of these informants (background, experiences in research and policy, formal and informal roles in related decision-making) and continues by exploring the actor-scenarios in which knowledges may have been used. Next, these informants are asked to provide their perception of utilization. Have the results been used and what role did they play in the evolving scenarios? Claims are explored through a critical dialogue in which an attempt is made to trace pathways to specific times and places.

Stage 3: Co-producing and sharing results (step 7-10)

In the third stage, the main activities are analyzing the *alignment efforts*, asking for feedback, clarifying inconsistencies and sharing the resulting maps for learning, improvement and accountability.

Step 7. Analyzing *alignment efforts*

The aim of step seven is to analyze the alignment efforts. The key questions are to what extent which *alignment efforts* were employed and how their functioning relates to the contributions that are realized. If specific *alignment efforts* have been identified beforehand, the information gathered about these efforts can be used to describe their functioning for each research project. A different approach is to start with analyzing the process and contribution map and to identify deductively which *alignment efforts* have played a role in realizing contributions. To analyze how *alignment efforts* relate to contributions, both detailed in-depth analyses of single research projects and comparative multiple-cases studies can be useful.

Table 1 Example of nine alignment efforts

1	**Attuning research to formally established research priorities**
	This effort may be of interest if there is a formally established list of research priorities that is intended to attune research to needs of end-users (e.g. patients, policymakers, health workers). When the needs of stakeholders from the action side are taken into account in priority setting, this provides a first step to towards attuning research to action. Investigators then have to take these priorities into account when formulating research proposals and these priorities have to play a role when selecting projects for funding. Assessing the role of this alignment effort, allows these various steps and/or the overall correspondence between a research question and the set priorities to be explored.

2 Attuning research to action processes in which investigators have a role

In this *alignment effort*, one of the investigators has a double role in action and may be considered a potential *key user*. Investigators may be involved in action processes as an adviser or board member, but also as the director of health services. Such double roles may be ideal for attuning research to policy processes. When assessing this effort, the focus can be on the extent to which research is attuned to needs and/or on the capability of the *double-role actor* to influence the dynamics in both research and action.

3 Engaging potential *key users* in research formulation

Engaging potential *key users* in the formulation of research may help the investigators to better understand the needs and expectations from action and may help them anticipate the context in which knowledge may be used. Engagement may help potential *key-users* anticipate utilization on the action side. When assessing this effort, the focus can be on the adaptations made to a research proposal as a result of this engagement, anticipations through engaged actors on the action-side, changes in relations between actors (e.g. increasing trust and understanding) and on the role and capability of the engaged actor(s) in influencing the dynamics in action.

4 Engaging potential *key users* during the production phase

Engaging potential *key users* in the conduct of research may help the investigators better understand the needs and expectations from action and help them anticipate the context in which knowledge may be used. On the other side, engagement may help potential *key users* better understand the research and anticipate utilization. Engagement may lead to new relations and provide a foundation for later utilization in action. When assessing this effort, the focus can be on the adaptations made to the research project as a result of this engagement, anticipations through the engaged actors on the action-side, changing relations between actors (e.g. increasing trust and understanding) and the role and capability of the engaged actor(s) in influencing the dynamics in action.

5 Engaging potential *key users* in interpreting the produced knowledge

Engaging potential *key users* in interpreting the produced knowledge may help frame the results in the context in which they may be used and help potential users to articulate actor-scenarios. In addition, personal interaction makes it possible to build trust and exchange knowledge with potential *key users*. When assessing this effort, the focus can be on the framing and interpretation of the results, the changing relations between actors, the exchange of knowledge and on the role and capability of the engaged actor(s) in influencing the dynamics in action.

6 Dissemination targeting potential *key users*

This alignment effort comprises one-way dissemination of knowledge products (texts) targeted towards potential *key users*. When assessing this effort, the focus could be on the extent to which knowledge products are adapted to specific audiences, the extent to which dissemination specifically targets potential *key users* and the way these potential *key users* receive and interpret the sent texts.

7 Utilization efforts by investigators

In this *alignment effort*, one of the investigators takes on the role of *key user*. Such a *double-role actor* may be involved in policy processes as adviser or board member, but also as an influential actor with the authority to make decisions in which the new knowledge is used. These *double-role actors* may initiate actor-scenarios in which the new knowledge has a role and actively stimulate the realization of these scenarios. When assessing this effort, the focus can be on the capability of the *double-role actor* to initiate actor-scenarios, bring new knowledge in and stimulate the realization of these scenarios.

8 Utilization efforts by *linked actors*

In this *alignment effort*, a *linked actor* takes on the role of *key user*. Through their role or formal function in action, the *linked actor* may initiate utilization by creating actor-scenarios with a role for the new knowledge and stimulating the realization of these scenarios. When assessing this effort, the focus can be on the capability of the *linked actor* to initiate utilization, bring new knowledge into actor-scenarios and stimulate the realization of these scenarios.

9 Utilization efforts by non-linked actors

In this *alignment effort* an actor who is not linked to a research project is expected to take on the role of *key user* in utilization at-a-distance. A non-linked actor can become a *key user* by taking codified knowledge from a reservoir and using it to initiate and realize actor-scenarios. Assessing this effort may be difficult as the non-linked actors that use the results have to be identified. The focus of assessment can be on the extent to which non-linked actors have access to the knowledge reservoirs, their absorptive capacity and their capabilities for utilization.

Step 8. Inviting feedback and validation

The aim of step eight is to ask interviewees and other stakeholders to provide feedback on the process and contribution maps and the descriptions or scores of the *alignment efforts*.

The preliminary results are shared with the stakeholders (in writing or presented to them) and they are asked if the results are consistent with their perceptions. This is important for validation of the results and enhancing ownership among stakeholders.

Step 9. Clarifying and describing inconsistencies

The aim of step nine is to clarify and describe remaining inconsistencies. In *Contribution Mapping*, results are not considered to be value neutral 'facts'. The described contributions are the result of articulating and negotiating different versions of reality. Actors may have different, incommensurable versions of the extent and way knowledge has been used. Inconsistencies are shared with those involved and they are invited to comment. Further clarification is stimulated by asking questions, pointing to blanks in narratives and facilitating constructive discussion. In some cases, inconsistencies may be clarified and a shared story is realized. In other cases, divergent versions of reality remain to exist. This is not unusual and can be expected especially for complex, diffuse and contested utilization processes in which many actors are involved. As an output, the different versions can be described with a comment that a shared version could not be established.

Step 10. Sharing results for learning, improvement and accountability

The aim of step ten is to share and employ the results for learning, improvement and/or accountability purposes. The information gathered during the first nine steps provides an overview of what has been done and gives a good indication of the contributions that have been realized and the roles of selected *alignment efforts*. The resulting maps should not be understood as fait accompli. The maps provide a time-bound overview of how processes have developed over time and the contributions that are realized at a certain moment. As the world continues to evolve, modifications to the maps can be made.

The way the resulting maps are used depends on the purpose of *Contribution Mapping* (see Table 2). For accountability purposes, the key outcomes, inputs and external factors are identified and shared. For learning purposes, the key lessons are identified by analyzing single cases or comparing multiple cases. If *Contribution Mapping* is employed for improvement purposes, the results could inform the formulation and execution of plans for improvement.

Table 2.

Using *Contribution Mapping* for specific purposes

Using CM for:	**Accountability**
	When using *Contribution Mapping* for accountability purposes, it should be clarified who should be accountable to whom (researchers to funders, funders to taxpayers, etc). Assessments for accountability purposes tend to focus on outcomes, combined with inputs and with the effects of exogenous factors. While it may be interesting to show contributions to policy, practice and innovation to the outside world, this may also lead to unrealistic claims and expectations. If accountability is the aim, the focus may well be on the activities for which researchers can be held accountable, such as initiated dissemination, and *alignment efforts,* such as engaging potential end-users. In addition, outputs and contributions can be described.
Using CM for:	**Learning**
	When using *Contribution Mapping* for learning purposes, the key questions are why research-related contributions are realized and how these contributions relate to research activities (in context). Depending on the precise question, multiple cases can be compared, or the focus may be on unique deviating cases. Cross-case analyses can be useful for revealing patterns between *alignment efforts* and contributions. Analyzing specific cases that deviate from the expected may help deepen our knowledge of how and why research contributes to action, in context. Analyzing multiple cases can also be an interesting test for the functioning of research programmes or systems.
Using CM for:	**Improvement**
	When using *Contribution Mapping* for improvement purposes, the key question is who should do what differently to improve performance? This requires inside-the-black-box relationships that connect changes in processes and activities to changes in contributions. To achieve improvement, a single assessment may be insufficient. Improvement generally requires trying out something new, careful observation and continuous learning in a conducive environment. The process and contribution map and analyses of *alignment efforts* can be used as a monitoring tool in the improvement process.

Discussion

In this paper we described *Contribution Mapping*, a novel approach to research monitoring and evaluation. At a time of growing emphasis on the use of research results and accountability, it is important to map research-related contributions and find ways to enhance the likelihood of beneficial contributions. We have tried to develop a realistic and practical approach that can be used to establish accountability and contains an explicit strategy for learning how the likelihood of beneficial contributions can be enhanced. We hope this makes *Contribution Mapping* a useful evaluation tool for those who seek to better employ research and knowledge to contribute to health, equity and development.

Contribution Mapping builds on an explicit description of the process of knowledge production and utilization with an active role of the user, in an evolving socio-material order full of ongoing change activities. This monistic perspective and the practical procedures of *Contribution Mapping* may also be useful for other analyses of knowledge utilization, such as knowledge translation platforms (El-Jardali et al. 2012).

In the introduction we described a number of challenges and problems that existing approaches for assessing research 'impact' struggle with. While recognizing the limitations posed by some of these problems, we have tried to develop a method that is useful in practice. Research utilization depends on distributed agency, which makes it difficult to 'measure' and attribute impacts. *Contribution Mapping* assumes that a plausible description of eventual contributions can be realized through a combination of a structured approach, a transparent process and engagement of those involved. In addition, the approach is intended to stimulate learning and reflection by those involved and stimulate further efforts to enhance the contribution of research.

An important choice in *Contribution Mapping* is to focus on the change in the abilities and actions of involved and *linked actors* as well as linked utilization, which is distinguished from utilization at-a-distance. An advantage of focusing on linked utilization, in combination with the *alignment efforts*, is that it directs the attention to what researchers and others can do to enhance the realization of beneficial contributions. This is essential in a learning-based and use-driven evaluation approach. Furthermore, the demarcation of linked utilization provides a certain boundary in ongoing and seemingly endless utilization processes, which is useful when the aim is to analyze and compare a number of research projects.

The initial focus on linked utilization has as a downside that the ultimate contribution to health at the patient level remains beyond the reach of the analysis. If such utilization at-a-distance is of specific interest, the stepwise approach of following actors and the routes of knowledge can be used to further map the pathways to more distant contributions. Retrospectively mapping such long and complex processes may be very difficult. The further the analysis moves away from the research project, the weaker the relation with the research project becomes and the more the attribution problem, user-identification challenge and pathway diversity and diffuseness problem may hamper the analysis. While the focus on linked utilization has its downsides, it makes a useful form of research monitoring and evaluation possible.

The indicators currently used to evaluate research and motivate researchers, such as publications in high impact journals, are unsatisfactory if research is to contribute to better action for health. Counting publications and citations keeps track of how often the ball is kicked across the middle line instead of in the goal. Scoring, in terms of contributing to better action for health, requires a collective effort which cannot be attributed to a single actor or project.
Instead of using poor indicators and incentives, or trying to make unrealistic and useless attributions, the focus should be on enhancing the contribution of research to the collective performance. With that in mind, we designed *Contribution Mapping*. The method is intended to reveal how to better anticipate, learn, communicate and align efforts to ultimately increase the likelihood that a contribution is made to collective achievements. We expect the method will be a useful tool for learning and improvement purposes and will allow those involved in research and utilization to take responsibility for the actions within their reach.

An approach to map the utilization of knowledge is much needed. We expect that applying *Contribution Mapping* in practice will provide important insights that can be used to further develop the approach as well as lessons on how research can better be employed to contribute to action for health. An important next step is to further develop a version of *Contribution Mapping* that can be integrated at the planning stage of research programs and projects and assist those involved with employing research to better contribute to an envisioned future.

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Chapter 9

Which health research gets used and why? An empirical analysis of 30 cases

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Introduction

One of the most common laments heard in research policy circles is that the results of even the best studies are rarely translated into action (Oliver, Lorenc, and Innvar 2014; Wehrens 2014; WHO 2013). This is especially distressing in the context of health-related research in lower-income countries, where new knowledge, well-used, has the potential to save lives and improve welfare (Hanney and González-Block 2015). The traditional response to this apparent under-use of research is to encourage researchers to communicate their results more effectively. While it may help, better communication tends to be insufficient for improving the use of research. Communication is not ad-hoc, but requires ongoing interaction and trust, as well as relevant infrastructure (El-Jardali et al. 2014; Wehrens, Bekker, and Bal 2011). In addition, local capacities are required for translating generic knowledge claims to the specific local situation in which they could be useful (Kok et al. 2012; Lemay and Sa 2013; Uzochukwu et al. 2016). An additional challenge that has long hampered research uptake in low-income countries is its limited local utility. As early as 1990, the prominent Commission on Health Research for Development reported that conventional health research contributed little to health and development in poorer countries because it was dominated by foreign scholars instead of locally embedded researchers, and met international rather than local information needs (The Commission on Health Research for Development 1990).

To align research more closely with national needs, local policy-makers, health professionals and community representatives were encouraged to join in with NGOs, academics and others to set national health research agendas (Wolffers, Adjei, and van der Drift 1998). The idea was that this would lead to research driven by the demands of local stakeholders, which was more likely to be used than research driven by supply from foreign academics.

It is, however, difficult to ascertain how these various efforts influence the likelihood that research results will be used. Studies of the use of research tend to start with finalized results or evidence based recommendations, and trace their use in action (Cohen et al. 2015; Oortwijn et al. 2008; Puri et al. 2014; Walugembe et al. 2015; Wooding et al. 2005). Most of these studies indicate that the use of research increases as potential users consider research pertinent, as research coincides with the users' needs, as the users' attitude is to give credibility to research and as results reach users at the right time (Burchett et al. 2013; Landry, Lamari, and Amara 2003; Oliver, Innvar, 2014; Orton

2011).

In line with these observations, research funders and others have tried to foster interaction between the producers and users of research. Initially, this interaction was focused on the joint interpretation of research results and the development of recommendations. More recently, interesting methods have been designed that encourage researchers and others to think how results might be used, and engage potential users from the time research is planned, and throughout research processes (Cooke et al. 2015; Hegger et al. 2014; Lomas 2000; Redman et al. 2015).

While approaches such as priority setting and involving potential users are increasingly promoted, there are few systematic studies that examine how they influence the eventual use of research (Hacking and Cleary 2016; Pratt, Merritt, and Hyder 2016; Viergever et al. 2010). Such studies need to examine what happens throughout research processes and relate that to the use of results (Hanney et al. 2003).

Our work aimed to fill this gap, using a newly-developed method known as Contribution Mapping to look systematically at thirty studies conducted in Ghana between 2001 and 2008 (Kok and Schuit 2012). These studies were part of a program jointly developed by the governments of the Netherlands and Ghana that aimed to increase the use of research by ensuring that it was locally relevant and locally led (Wolffers and Adjei 1999). Beginning with a national research agenda-setting process, the Ghanaian Dutch Health Research for Development Program supported research-use efforts at various points in the research process. Ghanaian professionals from three groups identified as representing the health research constituency were invited to submit research proposals that would fit the research priority agenda. These three groups comprised academia, policy makers at all levels and end-users of health research: the health workers and the communities that were to benefit from efforts to improve their health. NGOs were asked to represent the communities, and especially the more marginalized groups that were poorly reached by the regular health system. The Ghanaians leading the studies could invite Dutch researchers to collaborate with them. At the end of each study, the researchers had to submit a detailed report which contained a policy brief and specific recommendations, which were disseminated to potential key users. The research program started in 2001 and funded 79 research projects through five annual rounds of priority setting, proposal selection, funding and support.

Our study aims to map the contribution of these research projects to action and examine which features of research and translation processes were associated with the use of the results. To our knowledge this is the first study to try to systematically analyze the relation between features of research processes and the eventual use of research across the spectrum of health research processes in a low-income country, using a substantial number of case studies.

Methods

We used Contribution Mapping to assess how thirty research projects evolved and the results were translated into action. Contribution Mapping, which is described more fully elsewhere (Kok and Schuit 2012), is ground in social studies of science. Contribution Mapping recognizes that determining and attributing the ultimate 'impact' of research is often unrealistic and practically impossible. A true 'impact' perspective neglects the active role of users, who combine research outcomes with existing knowledge and use it for their own purposes in an evolving world full of ongoing processes.

This perspective begins with the idea that actors are constantly formulating and pursuing implicit or explicit scenarios about the future, with the intention of shaping this future. In these actor-scenarios, other people, technologies, knowledges, arti- facts and institutions, among other things, are assigned roles as characters in a 'fictitious script' about the future

A key feature of Contribution Mapping is that it contains a specific perspective on how research outcomes are integrated with existing knowledge and translated into action. This perspective begins with the idea that those who try to translate knowledge into action put forward a more or less explicit story about a future in which they assign roles and responsibilities to a variety of 'actors', such as people, organizations, technologies, budgets, artefacts (e.g. 'these findings mean that this organization should do this, those professionals should do that, these medicine should do this, and that funder is responsible for that'). Knowledge can be brought into such an 'actor-scenario' to confirm, support or strengthen it or introduce new elements. Knowledge can also be used to undermine the actor-scenarios of others (these findings show that they should stop funding because that policy will not work). When users bring research into such a scenario, they combine research outcomes with existing knowledge and formulate what that knowledge means for a specific aim in a specific situation Regardless of the role that knowledge plays, its use can always be analyzed in terms of evolving actor-scenarios. The actor-scenario perspective thus recognizes that research outcomes do not have a fixed meaning that is somehow imposes upon a passive user. While research outcomes can play a role, the perspective recognizes that such outcomes can be assigned different meanings by different actors in different situations.

Instead of trying to attribute ultimate 'impacts', Contribution Mapping focusses on how research and translation processes evolve and contributions to action come about, by tracing the actions of actors that are involved in, or interact with a research project and the most likely influential users amongst them, which are referred to as potential key-users. The method follows a structured, iterative approach in which key informant interviews and document analysis are combined to develop a narrative of how processes evolved and contributions to action were realized.

Determining whether a study was used

The outcome measure of our study was whether the results of research were used to contribute to action. A contribution to action can be described as a process in which knowledge plays a meaningful role in action for health. For the purpose of this study, we made a somewhat crude distinction between studies that were used and studies that were not. We considered a study as 'used' when at least one person described that produced knowledge had played a meaningful role in action for health, this was corroborated by someone else and/or documentary evidence, and the translation process seemed plausible to the external analyst. We focused on the contributions to action that could be identified between 6 and 12 months after a study was finalized. We chose this relatively fixed timeframe to allow us to compare cases.

Case selection

For this multiple case study, we selected the first thirty research projects of the Ghanaian Dutch Health Research for Development Program that were finalized. These thirty research projects were funded between 2002 and 2004 and are described in table 1. These research projects were all led by a Ghanaian principal investigator (PI) and included one or more co-investigators. Most research projects were completed less than two years after funding was provided. The research projects had budgets varying from ten to twenty thousand dollars, excluding the salaries of the involved investigators. Until at least six months after a study was finalized, those involved in research and translation processes were not made aware that the use of the results would be assessed.

The research program aimed to fund research that was oriented towards the national research agenda in Ghana. The research agenda was set in four steps: 1) reviewing existing research information, 2) consulting the health sector, policy makers and NGOs about research needs, 3) interviewing community members and 4) holding a workshop to prioritize issues based upon: existence of a problem, relevance, urgency, whether research was needed to solve the problem. The research agenda was widely disseminated and public and private research institutes, NGOs and other interested groups were invited to submit a letter of intent that fell within the research priorities. The best letters of intent were selected and research teams invited to submit a full proposal. Each proposal had to contain a section about the societal relevance/utility of the proposed research. An external, Ghanaian-Dutch scientific review committee reviewed the full proposals for scientific merit, societal relevance/utility of the research, feasibility within time, budgetary and methodological framework and ethical considerations. Final selection of proposals was done by the Joint Program Committee based on the comments of the reviewers.

Organization of data collection

Data collection started in March 2005 with creating an overview of the background and development of the research program. The assessment of each case started with reading available documentation, such as research proposals, mid-term reviews and final reports, and making a timeline-based process map. The timeline was divided into three phases: 1) formulation phase, 2) knowledge production phase and 3) the knowledge extension phase (e.g. dissemination and utilization). For each phase, the main actors, activities and interactions were mapped.

The first interview was held between twelve months and eighteen months after the investigators had established their results and were ready to disseminate them. The mapping process started with interviewing the principal investigators of a research project, developing a first version of the three-phase process map and identifying potential key-users and translation processes. Next, potential key-users and other informants were interviewed to trace, explore and triangulate possible contributions. In the third stage, process summaries were shared with key informants for feedback and validation. After inconsistencies were clarified, the process maps and description of contributions were finalized.

Interviewing

One hundred and thirteen purposively selected participants were interviewed face to face in four rounds of data collection (2005-2008) by four different researchers. Eighteen (18) participants were interviewed about several research projects. Thirty-six (36) participants were involved in the studies as PI or co-investigator. The others were selected as potential key-user or interviewed to further explore, triangulate or elaborate descriptions of translation processes and contributions to action. Most potential key-users had a leading role at the Ministry of Health, the Ghana Health Service or other health related organizations.

Following the steps of Contribution Mapping, interviewees were asked to describe how the process of formulating a study proposal and conducting research had evolved, and how produced knowledge claims were disseminated and translated into action. Interviewees were encouraged to be specific about processes and interactions, encouraged to provide detailed examples and share documents that supported their claims and provided further insight into how research and translation processes evolved. Examples of such documents are texts related to specific meetings, policy briefs, reports and presentation sheets. Emerging descriptions of translations and contributions to action were triangulated with subsequent interviewees, who could also put forward new stories of contributions and other documents that supported their claims. Interviews were audio recorded, except in five cases in which equipment failed or interviewees did not want to be recorded, and a detailed summary was made directly afterwards.

Data management and analysis

Directly after each interview, a detailed summary was prepared. By listening to the interviews, all relevant parts were identified and transcribed verbatim. Data analysis was done in two steps: 1) a detailed qualitative within-case analysis and 2) cross-case analysis. Data analysis for each case started after the first interview and continued during the whole data collection time (Hanney et al. 2003). Interview summaries, documents and transcripts were used to iteratively develop the three-phase process maps, and the contributions to action.

To identify which features of research and translation processes were associated with the use of research, we first analyzed the individual process maps and developed a set of open codes. Examples of codes are ‘involving potential key-users in the formulation of research’ and ‘targeted dissemination of written results’. Using constant comparative method of analysis and a manual coding system, two researchers and a research assistant then developed a more specific set of codes for those process features that seemed to matter most (Pope, Ziebland, and Mays 2000).

We then conducted a second systematic cross-case analysis, in which, for each case, we analysed the presence and role of the selected process features and described them in a table. For each of the process features, a specific summary was developed. Our analysis was recursive, constantly moving from the specific cases, to the more general, with the aim of identifying commonalities and patterns across the variety of cases.

This study did not require ethics approval in Ghana. Under Dutch law, ethics approval in the Netherlands was also not required. Even though formal approval was not required, we followed regular ethically responsible qualitative research practice to ensure that substantive ethical issues would be dealt with in an appropriate way. Informed consent to participate in the study, record the interviews, use quotations and publish the results was obtained from all study participants. A report with the preliminary results was shared with participants in 2008. Based upon comments, two small adaptations were made in how the data was presented. The preliminary results were presented and discussed at a meeting with participants in Ghana in 2008 and at a meeting in the Netherlands in 2009. Those involved in the discussions confirmed the presented results.

Results

We start this section with an overview of some of the studies and how they contributed to changes in health policy and practice. Next, we describe which features of research and translation processes were related to the contribution of research to action. In the last part, we further examine how translation processes evolved. In table 1, the thirty research projects and the most prominent translation process and contributions to action are described.

Table 1 The 30 research projects, process summaries and identified contributions to action

Research subject and embedding	Process summary	Identified contributions to action
1. The contributing factors to high treatment defaulter rate among TB patients in a region Ghana Health Service (GHS) regional hospital / data collected in hospital with patients from villages in the region	A user-investigator played a key role in mobilizing results. One of the investigators was the head of the regional TB program and utilized the results at the regional level through this function.	The results showed that financial constraint and distance were important reasons for defaulting treatment. Five new treatment locations were opened and the research findings were used in a successful grant application for defaulting prevention programs in other districts.
2. The role of stigma in the spread of HIV/AIDS in a district. GHS district health administration / data collected in various communities in a rural district	The research project led to a better understanding of the role of stigma. The results were described as not directly applicable, but warranting further research.	No contributions to action were identified. A new research proposal was drafted and funded.
3. Resistance to anti-microbial drugs in Ghana Medical School University Dept. of Microbiology/ samples collected in various hospitals in 9 regions	The investigators gave technical advice about the research subject to policy makers at both the local and national level. The results were discussed with several potential key-users, which seemed to have led to their eventual use.	The results showed that drug resistance was a problem in various regions. Hospital laboratories received feedback about their technical performance and some initiated a training in using standardized techniques and controls for laboratory tests. The results informed discussions and decision making about essential medicine at the GHS.
4. Community satisfaction, equity in coverage and implications for the sustainability of a health insurance scheme. GHS district health administration and research center / data collected at 4 health centers and households in a rural district	A user-investigator played a key role in mobilizing results. One of the investigators was a regional director of the GHS, advised the committee which drafted the NHIS policy, and was involved in implementing health insurance at several levels.	The study is part of a group of studies that contributed to the formulation of the NHIS policy. Among others, It revealed reasons why the poorest of the poor were not enrolling. The study also provided information that was used to develop a method for identifying poor people which was used in a program that provided premium subsidies to the poorest of the poor.
5. Evaluations of informal mutual health organizations in Southern Ghana. NGO involved in educational research / mutual health schemes in 4 districts were assessed	No potential key users were involved during the study. The finalization of the study coincided with formulation of the NHIS policy. The results and recommendations were extensively discussed with NHIS policy makers.	Several recommendations were incorporated in NHIS policy. Two examples are 1) providing districts with additional funding to start the NHIS in their district and 2) including the option to opt out and get involved in a personal scheme.
6. What the communities think about financing health through community health insurance GHS district health administration/ study was conducted in various communities in a rural district	Based upon this research project it was recommended that health insurance should be community based. At national level the choice was made for a district based health insurance scheme. No one from the national level was involved in the study.	No contributions to action were identified. The community based health insurance scheme that was set up as part of the research project is still being used 5 years after the study ended.
7. The perception of and demand for mutual health insurance in a district. GHS research center/ study was conducted in various communities in a rural district	No potential key users were involved in the research processes but the research proposal and the results were discussed and interpreted together with relevant district level policy makers.	The study identified existing decentralized structures that were used to improve the premium collection for health insurance. Education about the insurance was intensified in areas of low enrolment that were identified.
8. Communication and HIV/AIDS prevention messages through unorthodox community based means. NGO involved in educational research / study was conducted in a rural district	The research activities involved HIV prevention, which seems to have had the desired direct impact in the local situation. No actions to use the results elsewhere were identified. The PI of the study was not working in the health sector.	No contributions to action were identified. There were anecdotes that board games and other educational materials were still being used at schools in the district, but his could not be confirmed.

9. Assessing service delivery factors contributing to preventable maternal mortality in a region. GHS regional health administration / data were collected in 17 health facilities in a deprived region	A user-investigator played a key role in mobilizing results: one of the investigators was the regional director of the GHS, who used the results at regional level	The results were used to improve the provision and stores of consumables for obstetric care and the local drug procurement cycle. In addition, the results were used to improve the patient documentation system in a number of clinics in the region.
10. Assessing the quality of immunization in a district. GHS district health administration and health research center/ data were collected in various health facilities and communities	A user-investigator played a key role in mobilizing results: one of the investigators was involved in regional and district health policy as technical advisors and regional officer for public health (including EPI) and used the results in his own work.	The overall organization of the immunization in the region was improved, the communication to the communities about the immunization was improved and a policy to abolish selling food products and drugs in combination with vaccination was implemented in the region.
11. Better matching the training, support and incentive systems for leaders of sub district health teams to the requirement of the GHS at the sub district level. GHS district admin / study in GHS metropolitan, rural and semi-urban sub-districts	A user-investigator played a key role in mobilizing results: one of the investigators was a regional director of the GHS and used the results. The results were also discussed with, and sent to influential policy makers, including the deputy director general of the GHS	The research findings were used to design an initiative to strengthen sub district-level health administrations and sub metro-level health administrations in the Greater Accra region. Discussions were initiated with the School of Public Health for a MPH program that would be open to students without a Bachelor degree.
12. Improving the quality of health care delivery in a district in Ghana. University Dept of Agriculture/ GHS district health administration/ 5 health centers and communities	A user-investigator played a key role in mobilizing results: one of the investigators was a district director of the GHS and used the results. The proposal and results were discussed with the District Health Management Team and involved health institutions	As a result of the study hospitals have established, trained and institutionalized quality assurance teams. District wide parameters for quality assurance have been implemented. Uniforms of nurses were changed to lower rivalry between regular and enrolled nurses.
13. Assessing the impact of CHPS initiative in a district. GHS district health administration / conducted in households in a deprived rural district	A user-investigator played a key role in mobilizing results: the PI was a district director of the GHS and became the head of the nationwide CHPS program. He used the results through these functions. The proposal and results were discussed with the head of planning, monitoring and evaluation the MOH.	The study findings were used to facilitate the nationwide implementation of the CHPS program. The findings and experiences were used to develop a toolkit and a training program for implementing the CHPS program in other districts and regions.
14. The contribution of public health postgraduate students' research recommendations to districts to quality of health care improvement. University School of Public Health / 20 district health administrative area's	The research revealed limited use of research from MPH students. The project only involved university employees. No systematic changes in the organization of the research practice interface were implemented at the time.	No contributions to action were identified.
15. Communication channels and strategies and the potential role of community members in HIVAIDS awareness creation and behavioral change. GHS district health adm.and research center/ various communities in a rural district	The results were described as not directly applicable, but warranting further research. The project led to a proposal for an intervention study with regard to the stigmatization of HIV/AIDS patients.	No contributions to action were identified. There were indications that the research project has improved the HIV education in the district but this could not be confirmed.
16. Detection, assessment and prevention of adverse events following immunization with a new pentavalent vaccine. University Centre for Pharmacology / conducted in a teaching hospital, 2 urban polyclinics and a center for immunization	A user-investigator played a key role in mobilizing results: the research findings were used through the roles of the investigators in policy as head of the national immunization program and as technical advisor.	A multi-disciplinary advisory group to advice on AEAI was set up and continues to exist with sustainable funding from the Ministry of Health. Baseline data on adverse events following immunization have been collected for the first time in Ghana to the pentavalent vaccine and will guide policy making on immunization.

17. Prevalence of HIV, hepatitis B, hepatitis C viruses, infections, tuberculosis and syphilis among prisoners in Accra. University Department of Pathology / conducted among prisoners and prison officers in 3 prisons in Ghana	Two investigators were influential technical advisors to health policy on various subjects (though not specifically prison health). The proposal, process and results were extensively discussed with potential key users such as the prison council, director general of the prison services, Ministry of the Interior, MOH and the parliament committee on health.	Several contributions to action were identified. Results played a role in the decision to include prisoners in the National Health Insurance Scheme, provide anti-retroviral treatment and contributed to the closure of a prison that was housed in an old fortress. Involved parties were advocating for more systematic medical screening of inmates and a medical facility for prisoners. These discussions were still ongoing.
18. Assessment of male involvement in family planning decision making and practice and its influence on the uptake of family planning in a district. GHS research center and district health administration / conducted in 2 health centers and communities in a rural district	The research indicated that more male health workers should be trained to inform men about family planning. Investigators with influence at the district and regional level were involved, but influencing the actual training of male health workers required action at national policy level, to which they had no access.	No contributions to action were identified. There was little dissemination at the time of the assessment. A lack of resources for dissemination was given as the primary reason.
19. An assessment of the knowledge, attitudes, beliefs and practices on HIV/AIDS as a basis for integrating prevention and care services into the CHPS in a GHS district. District health administration/ conducted in 11 rural communities in isolated and deprived area	A user-investigator played a key role in mobilizing results: one of the investigators was a district director and head of the nationwide CHPS program. He used the results in his own work through these functions.	The study revealed that the perception of HIV/AIDS in the communities was little effected by CHPS. Specific messages for HIV/AIDS education for within CHPS were developed and implemented in the district.
20. Cost analysis and efficiency in selected hospitals in Ghana. University Department of Finance/ using data from a district hospital, mission hospital and regional referral hospital	The study was conducted in an academic institute. There was no substantial involvement of potential key users in the study. The results were disseminated to the administrations of three hospitals.	No contributions to action were identified. .
21. Incidence of adverse drug reactions from anti-tuberculosis drugs among patients treated for active tuberculosis and their impact on compliance. University Department of clinical and social Pharmacy / 13 health facilities in 2 regions	Investigators gave technical advice about, amongst others, medication and tuberculosis policy. The results were presented at two academic conferences. According to the investigators, the results confirmed existing knowledge and did not imply change.	No contributions to action were identified.
22. Sustaining the safe motherhood clinical skills of midwives. Regional health administration/ health facilities and midwives spread throughout a region	A user-investigator played a key role in mobilizing results: one of the investigators was a district director and headed the safe motherhood team in the region and used the results in his own work. Results were also disseminated to the health facilities and midwives involved.	The research led to the identification of shortages of specific equipment and consumables necessary for safe motherhood in health facilities in the region and lapses in the safe motherhood clinical skills of midwives. The results were used to address these shortages and to provide training for midwives during supervisory visits and were discussed which the schools where midwives were trained.
23. Comparative study of risk characteristics of successful and unsuccessful Mutual Health Organizations and implications for improving the success of health insurance. GHS district health administration and research centre	A user-investigator played a key role in mobilizing results: one of the investigators was involved in the development and formulation of the NHIS policy processes and stimulated the use of the findings	This research project contributed information, together with other studies, to the formulation of the district wide based structure of the NHIS. It also inspired the set-up of a policy advisory council in a new research project, which was to include representatives from the GHS, the National Health Insurance Council and MOH.
24. Delivery of integrated pro-poor health services in the decentralized politico administrative (assembly) context. University Institute of Local Government Studies / 4 district assemblies	A user-investigator played a key role in mobilizing results: the study was conducted by a team from an institute that provided training, consultations, advice and support to local governments. The findings were used in the programs developed and implemented by the institute.	The results were used in the design and delivery of a nationwide course for district and regional level environmental health functionaries. In addition, the results were used to shape proposals made to the Local Government Service on integrating health and local government services at the district level.

25. Participation of the urban informal sector in the National Health Insurance Scheme. University Department of Medical Biochemistry/ data was gathered in two urban areas known for informal trade	Involvement of potential key users, including members of the NHIS management, occurred throughout all phases of the research project. The results were discussed during a forum with the deputy director of the NHIS that was organized by the HRDP.	The results were discussed with representatives from the NHIS and were described as contributing to some reforms that were made to health insurance schemes, such an increased focus on the informal sector. Though reforms were in line with the study recommendations, other factors also played a role.
26. The allocative and technical efficiency of public health centers. GHS health research center / data were gathered in multiple districts	The PI was involved in the district assembly and discussed the proposal with the district director of the GHS. There was little dissemination as the main investigator went abroad for further studies. According to the investigators, the results should be used in national level policy.	No contributions to action were identified. The research project did however, generate further interest in the area of technical efficiency such that a study on hospital efficiency was undertaken by the GHS, of which the findings were later discussed by policy makers.
27. Developing unit cost data for health facilities to achieve cost standardization for an effective national health insurance scheme. GHS national headquarters	A user-investigator played a key role in mobilizing results: the PI was involved in various working groups in which national health financing policy was developed. The PI used the results to initiate and accelerate changes in financing policy. Influential policy makers were engaged in interpreting and simplifying the results.	The results were used in the development of the kind of flat fee system that will be used by the GHS for payments made to hospitals and health centres. The results were also used in influencing GHS hospitals funding arrangements.
28. A community based survey on the utilization of health care services for gastro-enteritis in children in a district. GHS health research center / conducted in villages and health centers in a rural deprived district	The study proposal and findings were discussed with the district health administration and utilized by the investigators in the formulation and implementation of a large trial.	No contributions to action were identified. The findings were used by researchers to monitor and predict the clinical attendance and behavior of mothers seeking health care for their children with gastro-enteritis in the district which was a prerequisite for effective recruitment for a Rota-virus vaccination trial.
29. A comparison of two approaches to increasing access and improving equity to malaria treatment among children under 5 yrs. GHS regional health directorate	A user-investigator played a key role in mobilizing results: one of the investigators was a regional director and advisor to the national health insurance council.	The results informed the development and organization of the insurance card that was used in some districts. The results were also used to support advocacy to reduce the delay in payment to health service providers under the national health insurance scheme.
30. A pragmatic randomized control trial into the compliance to artesunate-amodiaquine therapy for uncomplicated malaria in rural Ghana. GHS health research unit/ data collected in a large number of communities in a rural district	A user-investigator played a key role in mobilizing results: one of the investigators gave technical advice at the district and national level related to the study subject. The study findings were discussed with the head of the national malaria control program.	The study showed that patients often did not take the required dose of the therapy. Education was provided to the communities through health promotion radio messages. Health workers were instructed to better educate patients. A new therapy with fewer pills was under review.

Table 1. GHS= Ghana Health Service, NHIS= National Health Insurance Scheme, MHO= Mutual Health Organizations, HRDP= Health Research for Development Program, MOH= Ministry of Health, CHPS= Community-Based Health Planning and Services Program

The identified contributions to action

In twenty of the thirty studies, we identified a contribution to action between 6-12 months after the studies were finalized. We refer to these twenty studies as the 'used' studies.

The produced knowledge was used in many different ways. Several studies provided new knowledge about the nature and scope of health problems. This new knowledge was often used by investigators with a formal position in the health system. An example is case 1, a study into factors associated with treatment default among tuberculosis patients (Dodor and Afenyadu 2005). The PI of the study was in charge of the regional tuberculosis program and said that he initiated the study with the aim of improving tuberculosis treatment. *"For a long time I was concerned about treatment default, we talked about what to do. (…) This study created an opportunity to do something about it, to better understand the problems and improve treatment success".* The PI translated his results in several actions: "*This study showed that financial constraint was the main reason for patients for defaulting. Distance was one of the main issues, because they had to board vehicles to the hospital every day. When we noticed that, one of the things I have done is I have opened five new treatment locations to bring access to TB treatment. Previously there was only one treatment center in the whole district. We have also arranged for transportation money to the treatment and a daily meal during the intensive phase."*

Another study revealed unexpected problems with the functioning and implementation of the immunization program, such as illegal charges and the sale of food supplements by health workers alongside the vaccination (case 10). Poor mothers who could not afford these extra charges and food supplements felt stigmatized and were less likely to have their children vaccinated. One of the co-investigators of the study was a district director for the Ghana Health Service, who aligned the research proposal with his concerns about the immunization program in his district and his aim to improve it. Towards the end of his study, he was promoted to the position of regional director in the Ghana Health Service. In this new function, he used the results in designing and implementing a new communication policy, a policy on abolishing illegal charges and the sale of food supplements at vaccination sites and a new way for supervising the immunization process. *"When I started, I was at district level, so I saw the need to do something to EPI* (immunization program). *Being at regional level was a great opportunity. I met all the districts of the region and showed them the issues of immunization in Techiman, what I thought was not so different from other areas (...) actually showing what went wrong was important for making those changes".*

In many cases, the produced knowledge was first used in the research context and subsequently elsewhere. The co-investigator of the previous case said that he continued to use his results after he was transferred to a new region. In his new region, he informed the staff of the health districts about his study findings, encouraged them to look out for similar problems and implement the proposed policies. A district director confirmed this translation process: *"He has informed us in one of the EPI meetings (..). He studied the performance of the district and how to increase the performance. So he showed us the figures before the study, the difficulties they were having and after the study, the input they put in and the figures they were having. Since he came, we put everything in place."*

In several studies, new practices, protocols and methods were developed and tested, which were first implemented locally and subsequently used elsewhere. An example is case 12, in which quality indicators were developed and teams were trained to improve the quality of care in a district. After the research project, the use of the developed indicators and quality teams was continued: *"The quality assurance has been institutionalized. Some of the district wide quality parameters that were proposed are being used already. Some others are still being reviewed for use"* (district director Ghana Health Service). A different interviewee linked to the study in case 12 described a second translation process: *"there were constraints between regular and enrolled nurses. This had been ongoing for years and came out again during the focus groups. Before the report was even finished, they have changed the rule. Now they are wearing the same uniform to lower this rivalry"*. Two more examples are case 13 and 19, in which results were used to develop a training program and support package for implementing the Community-based Health Planning and Services Initiative. The program and support package was used by different people involved in implementing this initiative throughout the country.

Interviewees also described a range of unanticipated ways in which the conduct of the research itself contributed to changes in health service practices. Case 9 provides two examples. According to one investigator: *"When we conducted the study, we noticed very sharp shortages* (in consumables for preventing maternal mortality) *and linked up with the medical stores. When we found out that the stores were not there at all, we immediately reported to the regional director and made sure the situation was addressed. So indirectly that will enhance service delivery. And also the filing system: we had difficulties retrieving data. Some patients went out and with their cards. So, the records were not complete. When we discovered that, we had to correct the system. So, it facilitated the documentation system."*

In several cases, results were used by different actors in different translation processes. An illustrative example is case 17, a study into the prevalence of infectious diseases among prisoners and guards in Ghana. For years, there had been anecdotes and occasional media reports about the poor health status of prisoners. After being contacted by a concerned prison officer, a university based researcher initiated a disease surveillance study, that showed a significant outbreak of HIV and hepatitis C among prisoners and guards and a lot of risk behavior among prisoners, such as illegal drugs use, unprotected sex and tattooing with shared needles (Adjei et al. 2006). Counselling and treatment were provided and a peer education program was set up following the research in the prisons in which the studies were conducted. The prison service used the results to encourage the Ministry of Health to provide better health services to prisoners. Interviewees described how, after several discussions, the results played a role in the decision to include prisoners in the National Health Insurance Scheme. Other interviewees described how the results played a role in the lobby, and eventual decision to close Usher Fort prison, which was housed in an 17th century Dutch colonial fortress. Interviewees also described how the results inspired USAID to provide anti-retroviral treatment at a clinic next to Nsawam prison.

Another example in which results were translated in diverse actions is case 3: a study into resistance to anti-microbial drugs in Ghana. The study, which was initiated by a microbiology professor from a medical school, showed an alarming resistance to commonly used antimicrobials, such as tetracycline (82%), ampicillin (76%) and chloramphenicol (75%) and widespread multi drug resistance (Newman et al. 2011). The researchers provided several recommendations, such as training laboratory technicians, re-evaluating criteria for the use of antibiotics, enforcing laws on the sale of antibiotics and educating the public about their use. While participants described several plans that were inspired by the findings, most were shelved due to a lack of resources. The head of the Reference Laboratory described a plan to train laboratory technicians, but soon after this he retired. His successor was aware of the results, but did not mention any training plans and pointed to the lack of funding for such initiatives. The head of the Quality Assurance Unit described ideas to encourage laboratory testing before prescribing antibiotics, but had not taken any action. After additional interviews, two translation processes were identified. In response to feedback from the study, hospitals had taken the initiative to start a training for laboratory technicians. A policy maker pointed out that the results also played a role in discussions and decision making about the list of essential medicine at the Ghana Health Service. This claim was confirmed by second interviewee who attended the same meeting.

Participants reported that the results of seven studies (case 4, 5, 7, 23, 25, 27, 29) contributed, in diverse ways, to the design and implementation of the National Health Insurance Scheme. The development of the health insurance law was a lengthy, complex and sometimes highly contested process in which numerous actors were involved who negotiated about different proposals and plans, which slowly converged into the law that was eventually passed by Parliament in 2003 (Agyepong and Adjei 2008). During this process, countless ideas, recommendations and plans were put forward in which all kinds of knowledge claims, experiences and interests played a role. Participants described how results of two studies were used in this process to support new proposals and challenge existing plans that were being developed. Study 5 showed that citizens wanted to be able to opt out of the insurance and districts needed additional funding to start-up the health insurance, which were both taken into account in the eventual policy. Participants described how the results of study 5, together with those of study 4, supported the choice for a district wide organization of the health insurance and provided insights in how these could be implemented. Study 4 also provided a method for identifying the poorest of the poor, which was adapted and then used in practice.

Other studies were used in the implementation of the national health insurance. The results of study 27 were used to successfully advocate for a flat fee system for reimbursing hospitals. Unit-cost data that were developed during this study were used by the Ghana Health Service to fund hospitals. The results of study 7, 23 and 25 were used to improve the implementation of the insurance at district level. Study 7 showed local policy makers which groups were less likely to enrol in the insurance, after which a targeted enrolment campaign was organized. The results of both study 7 and 25 helped to identify existing structures and networks through which the insurance could better reach target groups and collect premiums.

Process features that were associated with the use of research

Below, we describe which features of research and translation processes were associated with the use of the produced knowledge. We start with the ones directly linked to the research program.

Fit with the national research agenda

The national health research priority strategy, which was a key component of the research program, helped to attune the research projects to the health sector priorities. The priority setting process, which interviewees described as useful, resulted in a research agenda with four priority themes (Table 2). These four themes matched with the health policy priorities that were described in the 2001-2006 Ghanaian Health Sector Programme of Work. The research agenda clearly influenced the formulation of research proposals. Some researchers said that they took the priorities as starting point for formulating a proposal. Others adapted their existing ideas and proposals to make them fit with the research agenda. Of the 30 assessed studies, 28 were clearly in line with the research agenda. This is unsurprising, since alignment with national needs was an important consideration in the selection of studies for funding.

***Table 2**: the priority themes of the national research agenda in Ghana*

1) **Communication and community participation**
   Specific needs: health education approaches in Ghana, beliefs relating to health and prevention, evaluation of existing communication approaches and related interventions in the field of the Priority Health Service Interventions, piloting community involvement in policy formulation, planning, implementation and evaluation at district level and institutionalizing community involvement.
2) **Quality of health care**
   Specific needs: staff attitude, referral system, assurance of technical skills of providers, drugs and logistics management and monitoring and confronting anti-microbial resistance
3) **Financing of health care**
   Specific needs: managing internally generated funds, improving management, formal and informal charges, pricing of drugs and services, introducing standardized pricing, comparative prices in private and public sectors, exemptions, especially for the poorest and most vulnerable and culturally and gender sensitive mechanisms to target the truly indigent and most vulnerable clients.
4) **Decentralization of health care**
   Specific needs: multi-sector coordination, integrating funding, balancing national and local priorities

Initiation by potential key users

Eighteen studies were initiated by people who were primary decision makers or held influential positions in the health system. These people defined research questions that arose from the programs they ran or advised and were thus themselves a potential key user. As one PI described: *"The proposal grew out of observations as a district director that there is a problem with the functioning of this level in the health system. From years of problems. All kinds of problems. Then you realize that, because when you talk with your other colleague district directors, and they all say yes, we also have this problem. So then it is like, instead of* *investigating this felt need in my little district, why don't I look at it beyond. So it was a national scale study."* Examples of these 'user-investigators' include the head of the regional tuberculosis program who initiated a study into therapy adherence, the district director who aimed to better implement the vaccination program, and a member of a health financing committee who studied ways to fund hospitals. *"It very much influenced how the proposal was structured, because I realized there was a gap that needed some kind of investigation, some kind of evidence, to be able to present, if I should say, a paper for policy decision to be taken."*

User-investigators were a striking feature of studies that were utilized: 17 of the 18 studies with a user-investigator were translated into action.

Table 3 Studies initiated by potential users

	user initiated (n=18)	not user initiated (n=12)
used (n=20)	17	3
not used (n=10)	1	9

Involving potential key users during the formulation of a research proposal

In addition to the potential key users who were part of the study team (as user-investigators), studies could also involve external potential key users during the formulation of the research proposal. Participants described different reasons for consulting these external key users. Some were consulted to inform them about the proposal, ask for input, or increase the likelihood of use. Others mentioned that these potential key users had to be consulted in order to access to study populations, clinics or hospital administrations.

These consultations often led to adaptations of research proposals. The proposal of the study into maternal mortality was adapted after discussing it with the regional director: "*It was his idea that I should refocus on the service delivery factors, because that is what we have immediate control over. I had to remodel the framework a bit. I was going for a broader investigation".* In the prison health study, the director of the Prison Service asked the researchers to include not only inmates, but also prison officers in the study.

User-initiators also discussed their proposals with other potential key users. One of them said: *"What changed the proposal? For example, comments like, well, because it is possible, we are going to look at this to inform policy in the whole health sector. The Ghana Health Service, which has over two hundred hospitals and over a thousand clinics. Can you expend the sample size? I think to about two of each type, across the country, about eight or so. Try to cover all types, locations? So that influenced the design and also the sample size."*

External potential key users were involved in the formulation of 8 of the 18 user-initiated studies and in 4 of the other 12 studies, of which 2 were used. In a further 4 studies, none of them user initiated, external key users were informed about research proposals, but were not involved in shaping them.

Table 4 Who were involved in developing the proposal?

		user initiated (n=18)		not user initiated (n=12)	
		no external users	involved external users	no external users	involved external users
used	(n=20)	10	7	1	2
not used	(n=10)	0	1	7	2

Introducing new practices as part of research

Activities that were part of the implementation of the research itself could also contribute directly to action, and make it easier to use the results. In several cases, investigators and others provided examples of direct contributions that resulted from research activities, such as training health workers to follow a protocol, reorganizing administrative or logistical procedures, or teaching community members about HIV or the right to exemptions during interviews. While these direct contributions were of limited scope, interviewees said that they often remained after a study ended, and facilitated the use of the results. Case 12 provides a clear example. For the purpose of the study, new quality indicators were developed and teams were trained to use them to monitor quality of services in local clinics. After the study showed that this quality improvement strategy was beneficial, the use of these indicators was institutionalized in the involved clinics.

Involving potential key-users in developing recommendations

In almost all used studies, potential key users were engaged in interpreting the meaning of the results and developing recommendations for action. In 15 of the 18 user-initiated studies and 5 of the 12 other studies external potential key users were involved in developing recommendations. A user-investigator said: "*First we sat down together in the region and pooled the study findings. We came out with an operational document. What is the job description of a sub district head? What support must be given to them? How should they relate? We then send it out, everybody has commented on it. We then said ok, let's start working with this.*"

Table 5 Who were involved in interpreting results and developing recommendations?

	user-initiated (n=18)		not user initiated (n=12)	
	no external key users	involved ext. key users	no external key users	involved ext. key users
used (n=20)	3	14	0	3
not used (n=10)	0	1	7	2

Targeted distribution of printed results

The results of almost all studies were distributed in printed form beyond the scientific domain. In three cases, this dissemination was organized by the secretariat of the research program. In the other cases, the researchers had themselves taken the initiative to disseminate their results. Investigators who tried to mobilize others to use their results more often said that they adapted texts and prints to their target audience and send it specifically to them: “*I send it to the Director of Human Resources and the Director General. What I did, I send not a research report, sometimes when people are busy, they don’t want a research report, but rather a memo.”*

Another investigator, who seemed very keen on the use of their results described: *“When we did the final report. The Health Summit, you know the annual health summit. It was going on. We couldn’t get a slot to present the report, but were allowed to give people copies. So we carried copies of the report there and gave everybody a copy. We budgeted to print the report so that it looked attractive.”*

While the distribution of printed results may have supported translation processes, it was never described as playing an influential role in the use of research.

The translation of results into action: examining the process

As the preceding paragraphs show, many researchers made concerted efforts to involve potential users in interpreting study results, and to make sure users were aware of those results. On further examination, we found that the translation of results into action involved a complex interplay between different actors with different ideas about the meaning of the results, actual change efforts in which results were used and evolving dynamics and structures in the context. Here, we describe some of these processes in more detail.

Envisioning what should be done, and who should do what

Researchers were themselves the first to shape the meaning of their study results. In four of the cases we studied, the investigators said that their results had no immediate implications for action. These investigators argued that their results confirmed existing knowledge or that further research was required. One of them explained: "*My findings and recommendations are not new things to the people in policy. They are things they already know. If there is anything at all, the presentation would only be to reinforce, to tell them that what they are doing is in the right direction.*" Not surprisingly, the results of these studies were not used to contribute to changes in policy or practice.

In the other 26 cases, the investigators said that their results should be translated into action, and they had ideas about how that should happen, and who should be involved. To achieve the changes they envisioned, actors put forward more or less explicit stories about a desired future, in which they assigned roles and responsibilities to a variety of actors and described what they should be doing. Depending on the forces at play and the situation in which these "actor-scenarios" were put forward, research knowledge was assigned a role in them.

A technical advisor who aimed to use the results of the antimicrobial resistance study provides an example of a scenario of the future in which roles and responsibilities were assigned to several actors: "*The results show the Ministry of Health that what is happening in Accra is going on all over the country. From now on, the Regions must apply the law. The Ministry must take the results and use them to educate the pharmacists. They need to better explain how to take the medication. They must also educate the general population and thirdly, the herbalist who mix antimicrobial agents with their herbs. They have to stop that.*"

The stories about what results meant for action were not automatically accepted. Some people became inspired and put forward similar or somewhat modified actor-scenarios. Others started to resist the envisioned futures and roles they were assigned, and put forward alternative views stories in which the results had different implications for what should be done and who should do what. This could lead to further actions and interactions, after which a relatively stable set of ideas emerged about what results meant for action.

We analyzed who, according to the investigators, should play a role in the scenario's which they described as leading to change. In 14 cases, the investigators said that they should themselves play a key role in achieving change. In the other 12 cases, the investigators envisaged others playing the main role.

Table 6 According to the investigators: who should play a key role in using the results to achieve change?

	user initiated studies (n=18)	not user initiated (n=8)
others should play key role in achieving change (n=12)	4 (3 used)	8 (3 used)
investigators should play key role in achieving change (n=14)	14 (14 used)	0

Investigators gave different reasons why others had to play a key role in applying their results. Eight of them said they were constrained because they did not work in the health sector. For some, this was reason enough not to foresee a role for themselves in acting on the study results. "*I am an economist and I work here at the university. We presented to them* (involved hospitals) *and gave them the report (...) How far they took it? It is up to them to use the result or not*".

Not all investigators shared this idea. Three of the eight, also university-based researchers, saw a role for themselves even though they did not imagine that they would be the prime movers in achieving change. They described a strong motivation to encourage others to use their results for change. One of them explained: *"We did the study so it is logical for us to want to move the findings forward. I am not sure if anyone else would try to move the findings forward."*

Others said that they would not be able to take forward their results because they lacked the required seniority, influence or responsibility. One investigator said that in Ghanaian culture, he would be considered too young to advise policy makers. Another investigator who was a district director and keen on the use of his findings, nonetheless felt that the results should be used in national policy processes, to which he had limited access and which were going in a different direction than the recommendation of his study.

Who mobilized results to achieve change?

Once the implications of results for action became accepted, people drew upon this accepted knowledge, and were influenced by it, to make real changes in policies and programs. In 14 of the 20 used studies, one of the user-investigators played a key role in using this knowledge for achieving change. In the other 6 studies that were used, others, with whom the results had been personally discussed, played a key role in making change happen. In only one case we identified a translation process that happened without any interaction with the investigators, but this occurred more than two years after a study ended.

Table 7 Who played a key role in using results to achieve change where study results were used?

	user initiated studies (n=17)	not user initiated (n=3)
user investigator	14	-
external user involved since formulation	2	1
external user involved only in interpretation	1	2

In all our cases, translations required efforts or support from people with a specific formal position, such as a regional health director, a program manager or a working group at the ministry of health. These formal positions were described as essential for acquiring support, mobilizing resources and making new knowledge part of concrete policies and practices.

Several investigators described how their position in policy processes became more influential because they were conducting a study. One of them said: *"When you do the study, then they know, it gives you a kind of authority in that area, they listen because you are involved, you have the data."*

In addition, some investigators said that they could scale up the use of their results when they themselves shifted positions, usually through promotions. An example is the district director in the immunization case, who was promoted to regional director during his study, and then transferred to lead a new region: "*When I came to this region, (...) I found out that most of the things I saw over there, I am seeing here. I am carrying my luggage with me. Wherever I am going, the data goes with me."*

Interviewees pointed out that formal positions also had their limitations. Their influence was limited to specific subject areas, locations and directions. They also emphasized that trust, reputation, advocacy skills and sheer persistence could be just as important for gaining access to policy arenas, gathering support and mobilizing resources so that results could be turned into action.

The role of structures and dynamics in the context

Translations were not only shaped by actors and the coalitions they build, but also by the evolving world in which processes were embedded. Ideas, budgets, local practices, equipment and infrastructures that played a role in the envisioned change and in concrete actions could not be mobilized at will, but were entangled in a larger world full of existing structures and ongoing dynamics. Ideas were linked to value systems, budgets were part of financing schemes, practices were embedded in a social order, equipment depended on trained health workers and physical infrastructures were shaped by the local landscape. As a result of these entanglements, the structures and dynamics in the larger world enabled some translations and constrained others.

While we focused our analyses on the actions of individuals, in some cases, these structures and dynamics seemed just as important for how translations worked out. An example of a larger dynamic that influenced several translation processes was the design and implementation of the National Health Insurance Scheme. Cases 5 and 6 illustrate how this interacted with research and translation efforts. Case 5 examined the functioning of district level health insurance schemes, while the study in case 6 focused on community-based health insurance. The study in case 5 was formulated and executed in relative isolation, with no involvement of potential key-users. Study 6 was led by a district health director, who interacted with potential key-users and was keen on making a contribution. When the national task force, which designed the blueprint for the National Health Insurance Scheme, was considering the role of the districts, some members became very interested in the recommendations from study 5. *"We had just finished the project when the government wanted to adapt the health insurance program. Most of our recommendations were incorporated in what was eventually adopted as national policy."* Despite the intentions and position of the district director, the results from study 6 were neglected by the national task force: *"It has not contributed to national policy because it didn't fit the current agenda. It should have, and I think it is a prophecy document."*

Discussion

The aim of our study was to map the contribution of health research to action and examine which features of research and translation processes were associated with the use of the results. All 30 cases in our sample were part of a program of health research which aimed particularly to foster locally led, demand-driven studies in Ghana.

Overall, we found that in 20 of the 30 assessed research projects, a contribution to action for health could be identified between 6 and 12 months after studies were finalized. It is difficult to compare this use rate with other research programs, since data are sparse. The few studies that have been published tend to focus on a small number of cases, use self-reporting without triangulation, and/or interview a limited numbers of informants (Hanney et al. 2005; Kwan et al. 2007; Oortwijn et al. 2008). Perhaps the most similar study to ours was recently conducted in Australia, and used a questionnaire, one interview per case and a panel to assess the 'real world policy and practice impacts' of 50 intervention studies within five years after finalization. In this study, 38% of the cases seemed to have 'impact', though this could not always be corroborated (Cohen et al. 2015). In our study of 30 cases, for which we interviewed several informants per case, the results of 67% of the studies were used to contribute to action for health within a year.

Our analysis suggests that this relatively high proportion is related to the strategy of the research program, which was designed specifically to enable studies that would be likely to contribute to action. Two aspects in particular seem to have made a difference. The first was the process of priority setting and study selection. This led to the funding of studies which were from the outset closely aligned with local health sector priorities, and that therefore posed questions that met the immediate information needs of those who shaped policy in health.

The second, and perhaps most important aspect of the program strategy in terms of the eventual use of research results was that research had to be initiated and led by Ghanaians; and that health sector professionals as well as academics were eligible to initiate studies.

Looking more closely at which features of research were most strongly associated with eventual use of study results, we found that one stood out above all. That was the presence of a single person who initiated the study, remained involved in the process, and was in a position to use the results in their own work. Critically, these user-investigators were likely to formulate 'need-to-know' research questions that filled urgently-felt information gaps and took initiatives to use their result. The results of 17 out of 18 of the studies involving user-investigators were translated into action.

The use of the results by the user-investigator was not the only reason why 17 of these 18 studies were used. Studies initiated by potential end-users were also more likely to involve other potential users in the formulation of research as well as in interpreting results and developing recommendations. In three cases, the user-investigators themselves did not have a major role in using study results. It was their ongoing interaction with other 'external' potential users that seemed to enable the use of the results.

If none of a study's investigators was themselves a potential key user, interaction with external potential users seemed critical to the use of results. In one case, involving research in prisons, potential key-users contributed to both the study design and the interpretation of results. In three other cases, potential key-users were not involved until the field work was completed. It was their engagement in the interpretation of study results that appeared to contribute to the translation of research into action.

Our findings are in line with an analysis of research impact in the UK by Greenhalgh and Fahy, that suggests that the use of research was characterized by an ethical commitment by researchers, strong institutional support and a proactive interdisciplinary approach to impact activities (Greenhalgh and Fahy 2015). Our findings contradict attempts to explain the use of research in terms of the characteristics of the results, such as their salience, applicability or validity (Dearing, Meyer, and Kazmiercak 1994; Lomas 1993; Weiss and Bucuvalas 1980). While results could certainly play a role, we found that the use of research was strongly influenced by those who put forward what the results meant for action. The involvement of potential key users in this process seemed to contribute to developing recommendations and concrete plans that were broadly feasible, taking into account the validity of results, the specifics of the local situations and the aims of those who shaped policies for health.

Our analysis of how translation processes evolved suggests that there were two overall dynamics in the translation of knowledge into action: a first in which investigators and others put forward stories about what results meant for action, which, after interaction and stabilization, could become part of the repertoire of locally accepted knowledge; and a second dynamic in which actors drew upon this accepted knowledge, and were influenced by it, to actually effect change. These processes were not linear or isolated, but recursive, and embedded in, and interacting with ongoing action and dynamics and structures in the context (Andermann et al. 2016).

This perspective on knowledge translation may be useful to those who study how context influences the use of research, evidence briefs or other knowledge products (Moat, Lavis, and Abelson 2013; Squires et al. 2015). The actor-scenario perspective suggests that context cannot easily be studied as a set of fixed factors that somehow have effect on the use of research, as different users may put forward very different actor-scenarios, in which the same results play a very different role and very different elements of ‘context’ are mobilized.

While several studies in other countries find that interaction with users enhances the likelihood that research is used, this is the first study to our knowledge in which the relation between what happens throughout research processes, and the use of the results, is systematically analyzed in a substantial number of demand-driven, locally led studies in a lower income country.

Our findings support Walley and colleagues, who, based upon experiences in China and Pakistan, argued for an approach of "getting practice into research: to get research into practice", especially for operational research in developing countries (Walley et al. 2007). An advantage of such an approach is that a problematic gap between researchers who 'discover' and policy makers and practitioners who 'apply' may not emerge (Lavis et al. 2006). Such an approach is perhaps not appropriate for research into new and untried treatments were the efficacy has not been established, but our study shows that it has great application for applied research.

A possible limitation of the focus on potential key users is that the use of results could be constrained by their authority or influence. In our study we found this not generally to be the case. In part because they were promoted and transferred, and in part because the use of results created a concrete example to others, which helped to spread changes more widely. A potential risk of involving influential users in research processes is that their aims and interests may bias research. While this requires attention, it is important to recognize that researchers themselves have their own aims, interests and perspectives, which may also need to be reflected upon (Hegger et al. 2014).

Researchers tend to focus on the written texts that they produce and disseminate and which they hope are picked up by others and then translated into action. We observed that results were mostly spread by people who were moving about, personal interaction and through the spread of successful innovations in which results were used. In none of our cases, the dissemination of written texts was described as important for the use of results. This can be explained perhaps by the important role of user-investigators and personal interaction, which may have replaced the role of written texts, our selection of interviewees, and our one-year follow up, which seems short compared to other studies. Another explanation is that the use of written texts by unknown individuals, at unknown times and places is rather difficult to map, which may lead to an overestimation of the role of interaction (Lemay and Sa 2013).

This study shows both the potential and importance of locally led, demand-driven health research in lower-income countries. The approach of the research program was inspired by the critique in the early nineties that health research contributed little to health and development in poorer countries because it was dominated by foreign scholars instead of locally embedded researchers, and met international rather than local needs. The research program tried to turn this around by fostering research that was driven by local demands and led by local researchers. Our analysis shows the success of this approach, in terms of contributing with research to action for health. This finding corresponds with analyses of research programs by others in several other countries (Brambila et al. 2007; Varkevisser, Mwaluko, and Le Grand 2001). Our analysis also shows the importance of local research for improving local action for health. While the studies did not produce major scientific breakthroughs, they often played a key role in improving local action for health, which is remarkable given their small budgets.

Considerations for research policy

The results allow us to formulate some suggestions for those who attempt to support research that more effectively contributes to health, in low-income countries and elsewhere.

A first suggestions is to continue promoting national research priority setting, which is becoming increasingly common around the world (Becerra-Posada et al. 2014; Mugwagwa, Edwards, and de Haan 2015). While priority setting is only a first step, a demand-driven priority agenda can assist researchers in formulating proposals towards local needs and can help funders to select studies that are more likely to be used. A careful and inclusive priority setting process not only helps to orient research to needs, but also provides a platform for interaction, building trust and networking, which are important for the eventual use of research (Cole et al. 2016; Mador et al. 2016; Mugwagwa et al. 2015).

A second suggestion is to stimulate research that is initiated and conducted by those who can play a role in the use of the results. A challenge is that the number of professionals with an influential role in health policy, sufficient research skills and the necessary time for research is likely to be small (Erasmus et al. 2016; Gonzalez Block and Mills 2003). It may be worth exploring how these user-investigators can best be incentivized and supported in their work, for example by junior researchers (Bates et al. 2014).

The third suggestion is to engage potential key users in research processes from the start, especially in designing research proposals, interpreting results and formulating recommendations. To select potential key users, researchers can try to envision how results may be used and who will play a role in that process (an actor-scenario), and then try to involve those who seem most interested and influential.

While this study shows the advantages of demand-driven research, several cases show that more independent and critical research is also essential for improving global health (Aaby and Benn 2011; Benn et al. 2015; Rodrigues et al. 2000; Shin et al. 2004). A risk of a unilateral focus on demand-driven research is that it may take prevailing ideas, power relations and dominant elites as starting point, and may lead to ignoring questions about what dominant views are based upon, the effects of power relations, and the needs of more marginalized groups (Pratt et al. 2016).

Limitations

The detailed interviews showed that each case was unique, context-specific and far more nuanced that we have been able to describe in this paper. In order to assess what played a role in whether research was used or not, we have been obliged to reduce a precarious, ongoing and complex process into a snapshot of a limited period and number of actors and actions. The 'use' and 'non-use' of results, for example, actually covers a wide and dynamic spectrum which is not fully reflected in a binary categorization. Similarly, the roles of individuals in the inherently collaborative process of research did not always fit as neatly into binary categories of 'user-initiated' or 'not user-initiated.' Our iterative and inclusive research design aimed to minimize the subjectivity of these simplifications. The large number of interviews, openness of participants and the relatively small number of key actors involved in both the research and policy community helped us to examine how processes evolved and to triangulate claims. While some investigators had the initial tendency to under or overestimate the use of their research, the shared exploration of how processes evolved often helped to describe the role that research knowledge had played.

Conclusions

In examining the contribution of health research to action we identified a number of features which have implications for organizations that support research, especially but not exclusively in low- and middle-income countries. Our study underlines the importance of supporting research that meets locally-expressed needs, and that is led by people embedded in the contexts in which results can be used. Supporting the involvement of health sector professionals in the design, conduct and interpretation of research appears to be an especially worthwhile investment.

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Chapter 10

Towards fair and effective North-South collaboration: realising a program for demand-driven and locally-led research

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Towards fair and effective North-South collaboration: realising a program for demand-driven and locally-led research

Introduction

For decades, researchers, funders, policy makers and other stakeholders have searched for better ways to organise research to contribute to health. The publication of the report of the Commission on Health Research for Development in 1990 signified an important change in thinking about research for health in low-income countries (The Commission on Health Research for Development 1990). The report stated that conventional health research did not match with the priorities in the global South and that existing North-South research collaboration was often counterproductive. The report described an enormous global mismatch between health needs and research investments, which was later referred to as the 10/90 gap: less than 10% of the global research investments was oriented towards 90% of the global health burden.

The global mismatch between health needs and research investments was only one part of the problem. Analyses showed that existing North-South research collaboration could constrain development by disturbing research priorities in the South and rewarding those who went along (Wolffers 2000). Researchers, donors, and governments from the North had their own priorities and interest in the South, which strongly influenced what was being studied and how it was being studied. The North's focus on universally applicable, biomedical insights and technological solutions and scientific publications as a measure of excellence could hamper the emergence of national research systems in the South by orienting talented local researchers to international agendas, instead of local needs and societal relevance (Wolffers, Adjei, and van der Drift 1998). This could fuel a vicious cycle in which local authorities did not engage with research because it did not fit their needs, and Southern researchers became internationally focussed and locally isolated because of a lack of local investment. Despite good intentions, international research collaboration could constrain development.

One response to the 1990 report was to invest more in researching diagnostics and treatments for diseases that had been neglected globally (Ogundahunsi et al. 2015). Prioritising this research seemed wise because the outputs were expected to be universally applicable. While promising, this 'globally oriented' research provided only a fraction of the knowledge required for improving health in low-income countries (The Commission on Health Research for Development 1990; Trostle 1992). At least as important was the locally specific research that countries needed in order to improve health outcomes and equity in their own situation (The Commission on Health Research for Development 1990; Vasquez et al. 2013). This research had to be oriented towards local demands and was best conducted by researchers who understood the local circumstances, interacted with intended users and could assist in translating results into action (Lansang and Dennis 2004; Nchinda 2002; Wolffers et al. 1998). In this article, we focus on the development and functioning of a program for such demand-driven and locally embedded health research in a low-income country.

In the early nineties, the Netherlands government took the initiative to develop a new kind of research collaboration which would combine demand-driven and locally-led research with genuine and equal North-South partnership. The Ghanaian government was interested in developing such a collaboration because it was trying to make health research more relevant for national development. Together with their Dutch partners, they designed an inclusive research program in which different voices in Ghanaian society were engaged in setting a national research agenda (Wolffers and Adjei 1999). Each year, Ghanaian professionals were invited to submit research proposals that matched this priority agenda. While Ghanaians led the studies, they could invite Dutch researchers to participate as co-investigators. After a long preparation, the Ghanaian-Dutch Health Research for Development Program (HRDP) started in 2001 and funded a total of 79 locally-led studies that were oriented towards the national research agenda.

The HRDP was presented as a new kind of approach to North-South collaboration in health research for development (Wolffers and Adjei 1999). Initiatives for strengthening research capacity typically focus on training individual researchers and strengthening the directly involved institutions (Bates et al. 2014; Boyd et al. 2013; Huber et al. 2015; Vasquez et al. 2013). In addition, there are initiatives that assist countries in developing and strengthening a research system by, for instance, assisting with formulating research policies and setting research priorities (Becerra-Posada et al. 2014; de Haan et al. 2015; Kok et al. 2012; Mugwagwa, Edwards, and de Haan 2015; Pang et al. 2003). While individual, institutional and system capacities all seem important, the effects of capacity strengthening tend to be constrained by a lack of funding for demand-driven research (Adewole et al. 2014; Mirzoev et al. 2013; Mugabo et al. 2015; Vasquez et al. 2013). In most low-income countries, the research funding provided by the government is barely sufficient for maintaining a basic research infrastructure and paying the salaries of local researchers. Meanwhile, international research funders continue to push their own priorities, instead of aligning with national research agendas (Adewole et al. 2014; Cohen 2012; Vasquez et al. 2013). Given these challenges, the approach of the HRDP provides a promising alternative. Instead of focusing on individuals, institutions or systems, the HRDP set out to realise an actual program for demand-driven and locally-led research, embedded in a low-income country and supported by a North-South partnership. The aim of this study is to analyze how this program for demand-driven and locally-led research came into being and functioned in practice.

Analytical Framework

To guide our study of how this demand-driven research program came into being and functioned in practice, we use a multi-level framework that builds upon existing literature on the functioning of scientific research. In most analyses of research capacity strengthening, a distinction is made between phenomena at three different levels that are required for the functioning of research, i.e. individual researchers, the institutions in which they function and the macro-level context (Hyder, Akhter, and Qayyum 2003; Lansang and Dennis 2004; Mirzoev et al. 2013; Nchinda 2002; Trostle 1992; Vasquez et al. 2013; Whitworth et al. 2008; Wight 2008). A similar distinction between three different levels is made by scholars who study the functioning of modern science in industrialised countries (Fujimura 1987; Rip 2002). Our analytical framework is based on the idea that phenomena at three different levels are required for the functioning of health research.

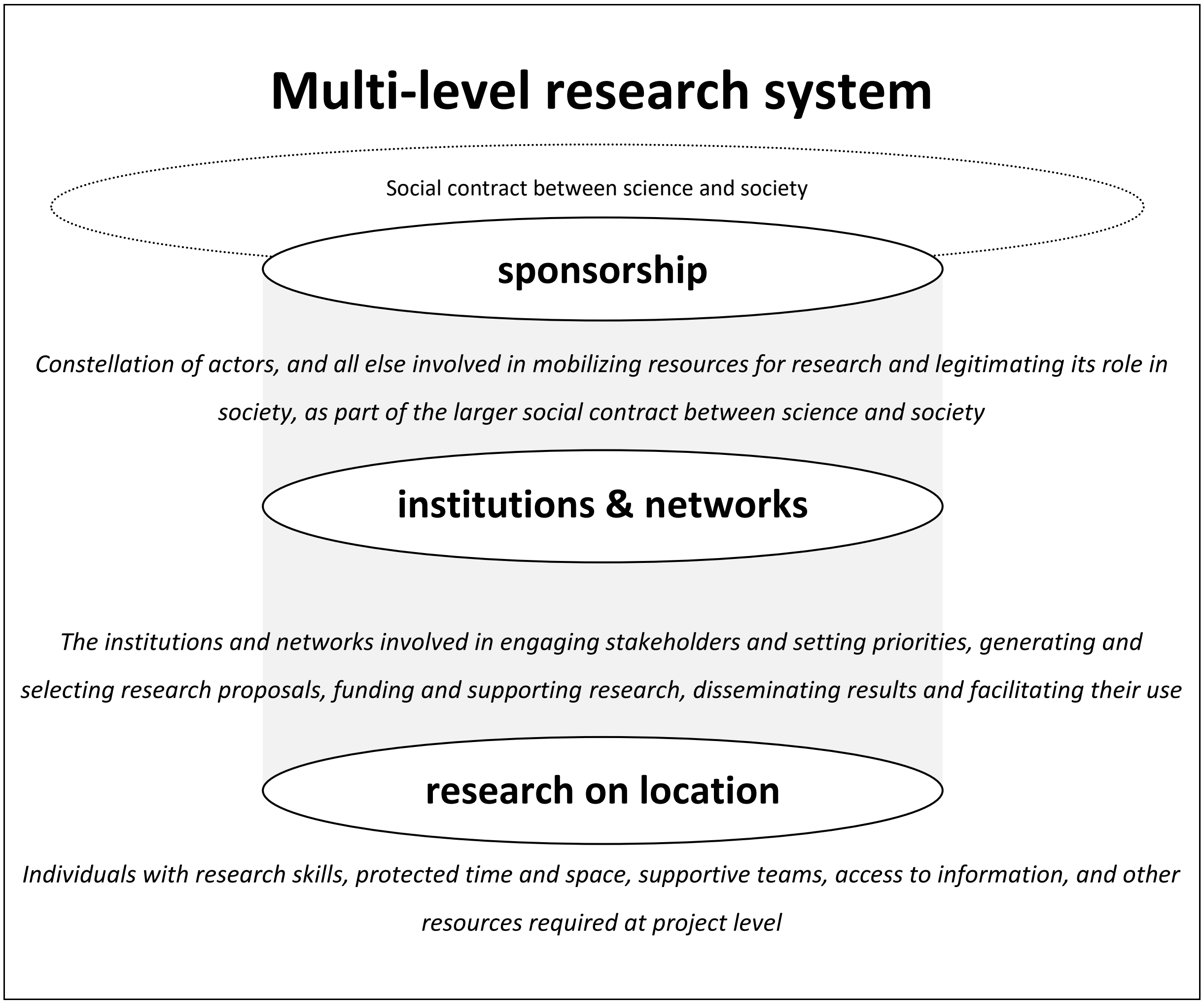
The first level in our model concerns the actual **research practices.** This encompasses all that is directly involved in producing research knowledge, including competent researchers, those who support them, the social and physical space in which they produce knowledge and all that is required for data collection and analysis and designing and disseminating transferable knowledge claims.

The second level concerns the set of **dedicated institutions and networks** that is required for demand-driven and nationally embedded health research. This includes the actors, organisational structures, practices and all kinds of resources involved in setting a national research agenda, generating and selecting research proposals, funding and supporting research projects and disseminating results. In addition to being a platform for engaging societal stakeholders, this second level also includes networks for interaction within the research community and the infrastructure that enables this.

The literature about research capacity strengthening is the least clear about the nature and role of the third level. Different actors and structures, such as governments (Ochola and Gitau 2009), donors (Wight 2008), the profile of research in the media and amongst policy makers and citizens (Whitworth et al. 2008), legal frameworks (Whitworth et al. 2008), international agencies (Nchinda 2002), donor funding (Mirzoev et al. 2013), national demand for research, political will and colonial histories (Jentsch and Pilley 2003), are described as being part of this third level. Some authors refer to this third level as something external, using terms such as context (Mirzoev et al. 2013), the external environment (Whitworth et al. 2008) or the macro-level context (Vasquez et al. 2013). At the same time, authors point to the influence that these actors and structures have on the research that is being conducted, which suggests that this third level is not external, but an integral part of the functioning of research (Jentsch and Pilley 2003; Ochola and Gitau 2009; Trostle 1992; Vasquez et al. 2013; Whitworth et al. 2008).

Analyses from the field of science studies help to specify the nature and role of this third level. Historical and sociological studies show how, within modern science, research on location and the required institutions and networks are functionally dependent upon a third constellation of actors, ideas and structures which fulfils two core functions: mobilising resources for research and legitimising its role in society. This constellation is at the core of what Guston describes as the 'social contract' between science and society (Guston and Keniston 1994; Rip 2002). Because our study focusses on a specific research program, we will not assess this larger social contract, but focus on the specific **sponsorship constellation** that mobilises resources for a research program and legitimises its role in society. Our analytical framework, representing these three different levels, is illustrated in Figure 1.

Figure 1. Multi-level research system



Constellation of actors, and all else involved in mobilizing resources for research and legitimating its role in society, as part of the larger social contract between science and society

The institutions and networks involved in engaging stakeholders and setting priorities, generating and selecting research proposals, funding and supporting research, disseminating results and facilitating their use

Individuals with research skills, protected time and space, supportive teams, access to information, and other resources required at project level

Methods

For this in-depth case study, data were collected between 2005 and 2012 through document analysis, key informant interviews and observation of program events.

Organisation of data collection

The documents used for this analysis are reports from the Development Assistance Research Council (RAWOO), the 2001 Program of Work of the HRDP, a book chapter about the design of the HRDP, health policy documents from the Ministry of Health and the Ghana Health Service (GHS), yearly reports of the Health Research Unit of the GHS, research proposals and final reports of the research projects and minutes and reports of program meetings and workshops. We also analyzed the report of a review of the HRDP that was conducted in March-April 2005 by two Ghanaian consultants.

The second method of data collection was interviewing purposively selected key informants. The majority of the interviews were conducted for a detailed impact evaluation of the individual studies, which is published elsewhere (Kok et al. 2016). For this impact evaluation, 113 interviews were held during four periods between May 2005 and June 2011. These interviews focussed on the contribution to action of the first thirty research projects that were funded by the HRDP. This impact study was led by the first author of the present study, who was supported by three other external researchers. The interviews for this impact analysis focussed on how these thirty research projects were formulated, how they evolved over time and how the results were used to contribute to action. For each case that was assessed, the principal investigator and/or co-investigators and potential key users were interviewed, amongst many others (Kok and Schuit 2012). For these interviews, a combination of a questionnaire and a topic list was used. The investigators who were interviewed for this study were asked about such issues as their previous experience with research and health policy, reasons for being involved in research, collaboration with researchers from the North, career perspectives, constraints in the research environment and their perspective on the functioning of the research program.

In addition to the interviews for the impact evaluation, we conducted sixteen interviews with eleven purposively selected key informants who were directly involved in the development, daily management and termination of the program, such as research coordinators, program management, members of the Joint Program Committee and staff of the Royal Netherlands Embassy. Notes were taken during all interviews and seven interviews were recorded and transcribed. Based on notes and/or the transcription, a detailed summary was made of each interview.

The third method of data collection was the observation of events that were organised by the HRDP, such as capacity building workshops, seminars at which research was presented and meetings at which the functioning, continuation and termination of the HRDP was discussed, in both Ghana and the Netherlands. Notes were made of these observations.

One interviewer and a data management assistant were involved in data analyzes. Data were analyzed manually by identifying and coding statements in documents, notes from observations and interview summaries according to topic. This was done together by the lead researcher and a data management assistant, after which the emerging themes were discussed. Summaries were then made for each theme using a constant comparative method of analysis (Pope, Ziebland, and Mays 2000). Our analysis was recursive, constantly moving from specific examples and events to the more general chronological description, with the aim of identifying the most relevant dynamics and patterns.

Using these theme specific summaries, a thick description was drafted of the three chronological phases of the research program (the development phase until 2001, the functioning between 2001-2006 and the ending of the program). This process description was used to draft a first version of this article, which was shared with two Dutch and two Ghanaian members of the Joint Program Committee who had been involved in the development and operations of the research program from the early nineties until after its formal ending in 2008.

This study did not require ethics approval in Ghana. Under Dutch law, ethics approval in the Netherlands was also not required. Even though formal approval was not required, we followed normal ethically responsible qualitative research practice to ensure that substantive ethical issues would be dealt with appropriately. Informed consent to participate in the study, record the interviews, use quotations and publish the results was obtained from all study participants. A report with the preliminary results was shared with participants in 2008. The preliminary results were presented and discussed at a meeting with participants in Ghana in 2008 and at a meeting in the

Netherlands in 2009. Those involved in the discussions confirmed the presented results.

Results

We present the results in three parts. We start by showing how, in the early nineties in the Netherlands, a vision for a new approach to North-South research collaboration was developed, which, together with Ghanaian policy makers, researchers and health sector and NGO representatives, was turned into a proposal for a program for demand-driven and locally-led research in Ghana. In the second part, we focus on the functioning of the research program and the efforts and dynamics involved in increasing its performance. In the third and final part, we show how the research program came to an end after changes in development policy led to the collapse of its sponsorship constellation in the Netherlands.

1990-2001: Translating a vision into a research program

The development of the HRDP started in the early nineties in the Netherlands. At the time, numerous scholars from Dutch universities were involved in health research in low-income countries. Most of this research focussed on specific diseases, such as malaria, tuberculosis and leprosy. This research was mainly funded through the Science Councils of the Netherlands Organisation for Scientific Research (NWO), which was funded by the Ministry of Education, Culture and Science. The NWO Science Councils represented the interest of Dutch academia and focussed on scientific excellence, which was described as publishing new insights in leading academic journals.

Problematizing existing research collaboration

The origin of the new approach to North-South collaboration can be traced back to the late eighties, when the success of development aid, including the contribution of health research to development, was problematized (RAWOO 1989). In 1990, the newly appointed Minister for Development Cooperation in the Netherlands asked the Development Assistance Research Council (RAWOO) to study problems with existing research collaboration and provide advice on how the focus of health research for development could be geared more towards the needs of the South. In several reports, the RAWOO laid out why traditional research collaboration contributed little to health and development in low-income countries (RAWOO 1995).

The main problems were that research for health in the South was mostly driven by the priorities of funders in the North, matched poorly with local needs and had a narrow focus on specific diseases. Research was mostly initiated and led by foreign researchers, there was little funding for locally specific, social and health systems research and there was little attention for the local dissemination and use of results (RAWOO 1995, 1996). Within the South, research was often geared towards the interest of the elite, instead of the more marginalised. Due to the dependence on external funding, local research talent had to focus on international priorities and was turned away from national needs and local networks (RAWOO 1996). North-South research cooperation had helped to train researchers in the South, but had contributed little to the development of national institutions that were required for demand-driven and locally-led research.

In response to these problems, the RAWOO formulated a vision in which health research for development should be:

1) **demand-driven,** geared towards national priorities of countries in the South,
2) **participatory**, including all stakeholders in the South, especially the more marginalised,
3) **to strengthen local capacities**, of individuals, networks and institutions,
4) **societal**, multi-disciplinary research was required to deal with issues such as health,
5) **context specific**, to be applicable, knowledge had to relate to local circumstances.

The Netherlands Minister for Development Cooperation supported this new vision and asked the RAWOO to collaborate with the NWO Science Councils to jointly translate these ideas into a new kind of research program that would generate demand-driven, locally led and nationally embedded research for health in a low-income country.

Struggle during the preparatory stage

The translation of this new vision into an actual research program resulted in a long struggle in the Netherlands between the Science Councils and the development-oriented RAWOO. In June 1995, the RAWOO proposed a four-step process to develop a research program together with a partner country in the South. The steps were to:

1. Identify and shortlist potential partner countries in the South
2. Map the health research situation and potential for collaboration in selected countries
3. Set up a local Steering Committee for a priority-setting process in the selected country

4. Based on this country-specific research agenda, invite Dutch researchers to jointly develop a plan that would result in a program for demand-driven and locally embedded research

To facilitate the programming process in the Netherlands, a Program Study Committee was set up with representatives of the RAWOO, the Science Councils and other stakeholders. At the first meeting of this new committee, representatives from the Science Councils started to question the approach that was proposed by the RAWOO. Science Council members claimed that a new program should focus on scientific excellence and argued that engaging local stakeholders in the South would be very complicated. Instead of asking stakeholders in the South about their needs for research, Science Council representatives proposed that research priorities should be identified in the Netherlands before selecting a partner country in the South. The RAWOO members defended their ideas for a new approach by arguing that research for development should be demand-driven, locally-led and embedded within a national infrastructure that would facilitate its use. Since health policies were mostly made within national systems, health research for development should be embedded in national structures, and not just be linked to a theme (Wolffers 2000).

Selecting a partner country

While the discussion in the Netherlands between the Science Councils and RAWOO was ongoing, a partner country in the South had to be selected. To protect their existing research collaborations, Science Council members insisted that the new program should start in a country in which they were not very active. After extensive consultations, Mozambique, Benin and Ghana were selected as potential partner countries. From March to April 1996, a Dutch research team interviewed 59 participants in these three countries to map the present state of health research, ongoing research activities, capacity-building needs and the potential for collaboration (Wolffers 2000).

The mapping study provided further evidence for the problems with existing research collaboration and showed the need for a demand-driven approach. The report of the mapping study provides some illustrative quotations (Wolffers et al. 1998). The Vice-Minister of Health in Mozambique confirmed the influence of the North on the research agenda: *"Research is influenced by donors' fashion, donors' interest. We are heavily dependent on donors"*. Another informant pointed to the consequences of the lack of local funding: *"Each institute is developing towards isolation. We have not enough State funding"*. Others addressed the difficulties with accessing scientific articles, and pointed to the mutual dependency that reproduced the existing system: *"It is a kind of trade: they need the field, we are getting some funding"*.

Based on the mapping study, Ghana was invited to jointly develop a new research program. The Dutch were eager to collaborate with the Ghanaians because they had met with enthusiastic research advocates at the Ghanaian Ministry of Health, who aimed to make health research more useful for national development and had decentralised research to three health research units that were located in the north, center and south of the country, with a coordinating research unit in the capital Accra (HRU 1997). While the Ghanaian government funded this research infrastructure, it provided no significant funding for demand-driven and locally-led research. Local researchers generally depended on foreign funders, collaboration with foreign partners and international research priorities and were keen to initiate and lead their own studies.

While the Ghanaians were invited to collaborate, the discussions in the Netherlands between the Science Councils and the RAWOO continued. Science Councils representatives tried to change the way the program was developed by suggesting that the Ghanaian research priorities should be taken as starting point for developing a thematic program for the region. Next, they proposed to restrict priority setting in Ghana to areas in which Dutch researchers had considerable expertise. Difficult negotiations and strong support from the Netherlands Minister of Development Cooperation were required to continue the preparatory process.

Agenda setting workshop in Ghana

In August 1996, a local steering committee was set up in Ghana, which was tasked with organising an agenda setting workshop. Three groups of research stakeholders, which were referred to as 'the three voices', were identified to be engaged in the process: 1) health policy makers at all levels, 2) the research community, and 3) end-users, including health workers and NGO representatives who would serve as proxies for the more marginalised in Ghanaian society.

In March 1997, the first agenda setting workshop was held in Ghana. Over one hundred participants from the government, health sector, research community and NGOs gathered for the first time to discuss the research needs of the Ghanaian health sector. A Ghanaian researcher later recalled the meeting and the diversity of participants: *"everyone was together, from the ministry, policy, from research, many,* *you know, from NGOs (…) I was surprised to see the people who were at the meeting. Some of them were from very grass root organisations who are operating small projects in the Volta Region and decided to come out. (…) It was demystifying research as something that just academics do."*

The workshop resulted in a list of principles for a research program within a North-South Collaboration:

1. The research agenda should be based on national needs
2. Ghanaians should take the lead in research projects and in choosing partners
3. Research should be inter-disciplinary and engage stakeholders throughout the process
4. Research should be integrated with capacity building
5. Research cooperation should be based on mutual respect

Program development workshop in the Netherlands

The next step in the development of the program was to organise a workshop in the Netherlands to discuss how the Dutch research community could contribute to the Ghanaian research needs. The Dutch researchers were keen to draw up a list of research topics that they could focus on. The Ghanaian representatives were more interested in how the program would be organised and emphasised that agenda setting should be an ongoing process that would be driven by local needs. In the end, participants recommended to set up a Joint Program Committee with Ghanaian and Dutch representatives who would guide the development of the program and the priority setting process.

Drawing up the final program

In the Netherlands, the struggle between the Science Councils and RAWOO continued until the final program proposal was submitted to the Minister in November 1997. For several months, representatives of the Science Councils refused to support and sign the program proposal. They argued that the Dutch researchers had not been treated as equals during the design of the proposal and insisted that the research program should be based on themes instead of national priorities and scientific quality criteria instead of societal needs. They demanded a Dutch steering committee that could overrule the Joint-Program Committee. At its last meeting, the Program Study Committee could not agree on how the program should be led and asked the minister to decide.

In February 1998, the minister decided to fund a pre-implementation stage in which the Joint

Program Committee could set up and oversee task forces that would develop a first research priority agenda, identify capacity building needs, draw up a strategy for enhancing research use and design an organisational structure. Soon after, elections were held in the Netherlands and a new minister for Development cooperation was installed, which delayed the process on the Dutch side. In 1999, the results from the taskforces were brought together and a 5-Year Program of Work was drafted, which was submitted to the new Dutch Minister for Development Cooperation, who approved it at the start of 2001.

The Ghanaian-Dutch Health Research for Development Program

The 5-Year Program of Work describes the strategy of the research program, its organisational structure and the expected outputs. It stated that the research program had three pillars:

a) to better attune health research to the needs of the public policy makers and end-users or beneficiaries in Ghanaian society at large, thus making it more demand-driven;
b) to put greater emphasis on the need to strengthen national capacity for health research, and to enhance local ownership by empowering the Ghanaian research partners and local stakeholders;
c) to redress imbalances in North-South collaborative research by promoting genuine research cooperation between Dutch and Ghanaian researchers, which should be based on mutual trust, joint learning and equal say and influence in decision-making and program management.

Organisational structure of the HRDP

The research program followed a demand-driven program cycle (see Figure 2). The research program was managed by the existing Health Research Unit of the Ghana Health Service in Accra and formally led by the Joint Program Committee, which was made up of three Ghanaian and three Dutch members. A separate secretariat in the Netherlands facilitated the process of involving Dutch researchers and would fund their work from a separate budget. For the first five years of the research program, 3.4 million US dollar was made available by the Netherlands Minister of Development Cooperation.

Figure 2: Program cycle of the HRDP

The program was designed as an ongoing cyclical process consisting of six elements:

Setting research priorities

The agenda setting was to proceed in three steps: 1) reviewing existing research and information, 2) consulting the health sector, policy makers and NGOs about research needs, 3) interviewing community members and 4) holding a workshop to prioritise issues based on: existence of a problem, relevance, urgency, whether research was needed to solve the problem. After the first year, the agenda setting workshop would be repeated annually to review the agenda and add new themes.

Generating research proposals that fit the research priorities

The research agenda was widely disseminated and public and private research institutes, NGOs and other interested groups were invited to submit a Letter of Intent (LOI) that fell within the research priorities. The funding limit was 20,000 US dollars, excluding the salaries of the researchers.

Selecting research proposals

The best LOI were selected and research teams invited to submit a full proposal (FP). An external, Ghanaian-Dutch scientific review committee reviewed the FP for scientific merit, societal relevance/utility of the research, feasibility within time, budgetary and methodological framework and ethical considerations. The final selection of proposals was done by the Joint Program Committee based on the comments of the reviewers.

Providing assistance to research

Capacity building workshops were held to enable junior scientists, health service providers and NGO representatives to develop LOIs and FPs, implement their research and write reports. These workshops focussed on protocol development, data analyzes, report writing and publishing. Experienced scientists from the HRU in Accra monitored the research process at a distance and offered assistance to the researchers where necessary during their research projects.

Scientific Advisory Committee approval

Once the research process had been completed, the research reports were submitted to the scientific advisory committee for approval. If necessary, the committee requested clarification or further elaboration of the research reports. After approval, the research reports were sent to the policy makers.

Enhancing effective dissemination

Final reports had to contain a policy summary and recommendations and a budget could be requested to help researchers disseminate their findings. To ensure effective dissemination, training workshops were organised for researchers on how to present research information to policy makers and other audiences. Dissemination meetings were organised to disseminate research findings.

In this first part, we trace the 10-year preparatory process in which a new vision for North-South collaboration was developed and translated into a research program for which a sponsorship constellation was established. The development of this program started with problematizing the contribution of research to health and development in the South and the traditional power relations that favoured the interest of researchers from the North. This problematization inspired a new Minister for Development Cooperation in the Netherlands, who asked an expert committee to develop a vision for a more equal and effective approach to North-South research collaboration. Meanwhile in Ghana, engaged policy makers were decentralising health research to three units and were aiming to orient research to the needs of the health sector. While Ghanaian and Dutch representatives set out to develop a more equal and effective research program, representatives from science organisations in the Netherlands opposed the plan to use development funding for research that would focus on Southern needs and would be led by Southern researchers. A series of meetings and a thorough priority setting process in Ghana confirmed the need for a demand-driven and locally-led approach and was essential for developing the program proposal that was eventually funded in 2001. The decision to approve and fund the 5-Year Program of Work stabilised the sponsorship constellation in the Netherlands and allowed the demand-driven research program in Ghana to start.

2001-2006: Making a demand-driven research program work

In this second part, we describe how the research program functioned during the five years in which it was fully operational and funded 79 locally-led studies in Ghana.

Research priority setting

The priority setting process showed there was a true need for demand-driven research in Ghana (see Table 1.). The national research agenda was very different from the priorities of foreign researchers and international funders. The four-page priority agenda did not mention any specific diseases, which used to be the main focus of research driven by the North. Besides different themes, participants in the agenda setting process also emphasised the need for locally specific research. Examples include health beliefs among Ghanaians, reasons for enrolling in health insurance, local problems with antimicrobial resistance and differences in prices between the public and the private sector.

Participants were positive about the diversity of stakeholders that participated in the agenda setting process. Policy makers had lobbied for issues related to health financing, decentralisation and quality of care that lay at the core of the 2001-2006 Health Sector Program of Work of the Ghana Health Service. The academic community advocated for more biomedical issues, such as the status of antimicrobial resistance, and NGO representatives emphasised themes such as community engagement and access to care for the most vulnerable, poorest of the poor and truly indigent. Participants reported that, besides articulating priorities, the agenda setting process was also useful for learning about ongoing research and policy processes and building a diverse national network of people engaged with demand-driven research.

Table 1: *The four themes and topics of the research agenda*

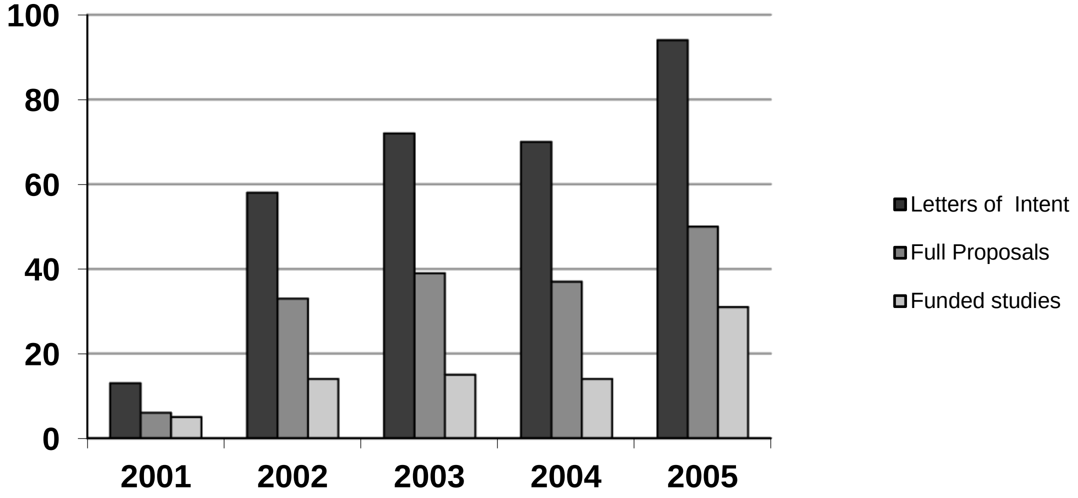
1) **Communication and community participation**
    Specific needs: health education approaches in Ghana, beliefs relating to health and prevention, evaluation of existing communication approaches and related interventions in the field of the Priority Health Service Interventions, piloting community involvement in policy formulation, planning, implementation and evaluation at district level and institutionalising community involvement.
2) **Quality of health care**
    Specific needs: staff attitude, referral system, assurance of technical skills of providers, drugs and logistics management and monitoring and confronting anti-microbial resistance.
3) **Financing of health care**
    Specific needs: managing internally generated funds, improving management, formal and informal charges, pricing of drugs and services, introducing standardised pricing, comparative prices in private and public sectors, exemptions, especially for the poorest and most vulnerable and culturally and gender sensitive mechanisms to target the truly indigent and most vulnerable clients.
4) **Decentralisation of health care**
    Specific needs: multi-sector coordination, integrating funding, balancing national and local priorities.

Generating and selecting research proposals

In the first years of the program, it proved more difficult than expected to generate locally-led research proposals. In response to the first call for proposals in 2001, only thirteen Letters of Intent were submitted and their methodological quality was below expectations. The disappointing number and quality of the proposals raised questions about whether sufficient local research capacity existed. The Joint Program Committee insisted on keeping up its scientific standards and invited only six research teams to submit a full research proposal, of which it considered five good enough to be funded.

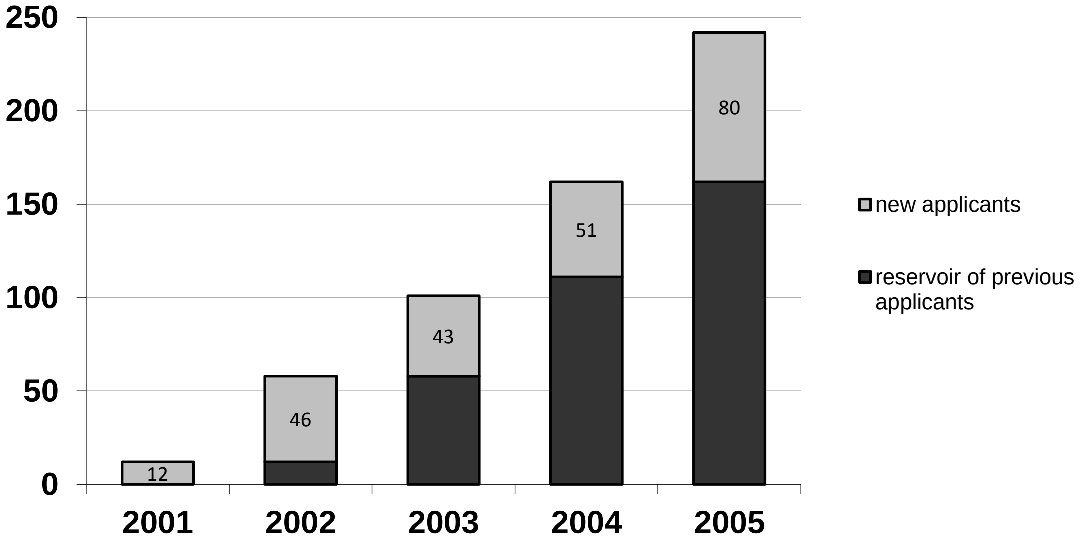
In response to the disappointing start, the program secretariat tried in different ways to increase the number and quality of the proposals that were submitted. To reach more potential applicants, the secretariat advertised the second call for proposals in two national newspapers and promoted the program in professional networks and during health sector meetings. To improve the quality of the proposals, the secretariat organised workshops in which applicants with good ideas could learn how to write a robust research proposal. In the subsequent years, both the number and quality of the letters of intent and full research proposals improved substantially, with 94 Letters of Intent and 31 funded studies in 2005 (see Figure 3.).

Figure 3. The number of submitted letters of intent, full proposals and funded studies



The rapid growth of the number and quality of the research proposals showed that a substantial, but partly latent reservoir of research capacity existed (see Figure 4). In total 304 Letters of Intent were submitted by 242 different lead applicants in response to the five calls for proposals. Only 5% of the 242 applicants submitted a Letter of Intent in the first year and 19% in the second year, and 71 eventually led a study.

Figure 4. The number of new applicants that submitted a proposal per year



When we asked those who submitted a research proposal about their involvement in research, several of them said that they did not consider themselves to be a 'researcher', as they worked primarily in a different role, such as policy maker or district health director. Many applicants had heard from others about the opportunities that the research program offered and became involved because there was funding available to study issues that were related to their own concerns, experiences and aims in the health sector, such as improving vaccination coverage, adherence to tuberculosis treatment or managing health professionals.

Supporting research and strengthening capacities

The program management tried out different approaches to monitor the quality of research and support research teams. In the first years of the program, two research coordinators travelled throughout the country to monitor the ongoing studies and provide hands-on support. Due to the growing number of studies, this support on location became too time-consuming. To increase efficiency, newly funded researchers were invited to an orientation meeting in which they were briefed about the program guidelines. Researchers were asked to present their work at a mid-term review and, if further support was needed, teams could request technical advice from experienced researchers from their own area.

To strengthen research capacities, the program organised workshops that focussed on specific skills, such as qualitative data analysis and report writing. In the first years, these workshops did not seem efficient, because the number of researchers was small and they had very different needs. A program coordinator who ran the workshops explained: "*it varies a lot* (…) *we had qualitative people that could barely design tables, and those highly technical who could not bring it down to a practical level*". While the increasing number of researchers in the subsequent years made the workshop strategy more successful, it remained difficult to engage the most influential health sector professionals in the workshops. "*We have tried a lot, but we haven't been able to solve it. You want the key people who can conceptualise, write up and follow through until the presentation. Those key people are busy.*"

The functioning of the research projects

Interviews with the research teams provide some insight into how the program contributed to the functioning of health research in Ghana. Participants consistently described that, without the

HRDP, their studies would not have been conducted because there was no other source of funding. An investigator explained "*it is the only funding source available (…) there are no alternative sources for doing our own research, so we rely on the program.*"

Besides funding research, the research program also helped to strengthen local research capacities. For about half of the principal investigators, it was the first time they had initiated and led their own funded research project. These investigators often emphasised how beneficial it was to them to formulate and lead their own study and be responsible for the results. *"I have gained a lot of skills from being in the lead. Writing a proposal and doing the reports, it has so much improved me."*
Several of these researchers said that leading their own study had helped them to build their confidence and inspired them to pursue a career in research: *"I would not have moved into research. It is the first well-funded project I had. I would have put my ambition on the shelf. The research center that I am building right now all started with this project."*

More experienced investigators described that the program allowed them to study issues that they had long cared about. A regional health director provides an example: *"The quality of the staff at the sub-district level is something that has bothered me for a long time and this enabled me to do some research on it. (…) The fact that I am able to come up with a research report makes me stronger in the discussions when I raise these issues."*
An important challenge for these more experienced investigators was finding the time to conduct their research. Many of these investigators had influential functions or advisory roles in the health sector. Their experience and networks helped them to link research to needs, but their busy agendas made it difficult for them to allocate the time for research and program activities. Several of these investigators described that they tried to engage more junior researchers in their studies and build teams that could support them in future projects. *"We still have some of them working with us as a result of the training they received for this study."*

In addition to strengthening the capacity of individuals, participants said that the research program contributed to the emergence of a more conducive research environment in Ghana. "*Health research is getting bigger. More people are involved and there seems to be an emerging research culture*". Another investigator confirmed this: "*It is helping to involve people in research and helping to keep some people in Ghana.*"

The involvement of researchers from the Netherlands was less than anticipated. Ghanaian researchers could invite Dutch researchers to collaborate with them. These Dutch researchers were funded from a different budget. Even though most Ghanaian investigators said that they liked the idea of international collaboration, Dutch researchers were involved in only 14 of the 79 funded studies. Several Ghanaian investigators said that it was not necessary to bring in a foreign researcher for their specific study. Others said it was difficult to find a partner. When we asked why they engaged Dutch researchers in their proposals, Ghanaian participants said that they hoped to benefit from specific technical expertise, sharing of experience and perhaps new opportunities for future research through international collaboration.

External review of program performance

An external review of the HRDP in 2005 confirmed that the program succeeded in its aim of generating and supporting demand-driven and locally-led research. The review was requested by the Joint Program Committee, who asked independent reviewers to assess whether the program had achieved its objectives and suggest how the results could be sustained into the future. The review team concluded that in Ghana, a well-functioning set of institutions had been developed for setting a national research agenda, generating and selecting research proposals and supporting research on location. In the report, the research agenda was described as ‘inclusive and consistent with the formal health sector priorities’. The system for short-listing Letters of Intent and reviewing proposals was described as ‘effective and highly commendable’ and the organisational structure, relations and procedures for assessing and supporting research were described as well functioning. The reviewers concluded that overall, the HRDP had generated a research cycle that was not only demand-driven but had actively involved the Ghanaian community. Mutual trust, respect and transparency had been developed between the Ghanaian and Dutch partners and provided a solid foundation for the future.

Assessing the use of research

Besides the functioning of the program, the Joint Program Committee was also interested in whether the program strategy increased the likelihood that results were used. In March 2005, Dutch researchers were asked to start mapping the use and impact of the funded research. This first assessment was to include all sixteen studies of which a final report had been submitted to the secretariat, and should focus on *whether* and *how* the results were translated into action and explore *how* this related to the strategy of the research program.

The impact assessment revealed that, within 12 months after finalisation, the results of 10 of the 16 studies had been used to contribute to action (Kok et al. 2016). The mapping study provides some insight into the kind of studies that were funded and the way that results were used. Some studies contributed to the functioning of existing health programs. One example is a study that assessed the quality of the immunisation program at the district level. The study showed several shortcomings in the vaccination process and a lower than reported coverage. Several recommendations were formulated and implemented, such as a new strategy for communicating with communities, better reporting and supervision and a policy to abolish the illegal sale of medicine and food products by health workers at vaccination sites, which prevented the poorest of the poor from having their children vaccinated. A second study showed that essential medicine and consumables needed for preventing maternal mortality were often not available in rural clinics in northern Ghana. Participants described how the results were used to improve the distribution and supplies of consumables and strengthen the documentation system. A third study showed that distance to the clinic and the costs of transportation were important reasons why tuberculosis patients did not finish their treatment (Dodor and Afenyadu 2005). The results were used to open five new tuberculosis treatment spots and decide where they should be located.

Research also contributed to the development and implementation of new health programs. One study focussed on ways to improve quality of care in health districts. The results were used to establish indicators and quality teams for monitoring and improving quality at the district level. Another study assessed how the new Community-based Health Services and Planning Initiative could be implemented. The results were used to develop a support package for implementing this planning initiative, which was used in districts throughout the country (Nyonator et al. 2005) .

Three studies contributed to the design and implementation of the National Health Insurance Scheme, which was a key priority of the Ghanaian government (Agyepong and Adjei 2008). One study had shown that the poorest community members were less likely to participate in district health insurance than others and were difficult to identify (Baltussen et al. 2006). The results were used to adapt a method for identifying the poor and improve the local implementation of the insurance. A second study had focussed on the perception of, and the need for, community health insurance in Northern Ghana. The results were used to identify structures for collecting premiums and organise a targeted campaign to increase participation in urban districts.

A challenging question was whether the use of research related to the demand-driven strategy of the research program. The systematic analysis of research and translation processes showed that the priority setting and proposal selection process led to the funding of studies which were from the outset closely aligned with health sector priorities. What seemed even more important, in terms of the eventual use of the results, was that research was initiated and conducted by people who aligned research to local needs and circumstances and tried to play a role in translating results into action (Kok et al. 2016).

Between 2001 and 2005 the research program was thus increasingly successful in generating, funding and supporting demand-driven and locally-led research. During these years, there was little attention for the sponsorship constellation that supported the program. The approval and funding of the 5-Year Program of Work by the Netherlands government in 2001 provided, at least temporarily, a protected space that allowed those involved to focus on the functioning of the research program and the actual research projects. The external program review and impact assessment showed that the HRDP succeeded in generating and supporting demand-driven and locally embedded research, of which the results were translated into action.

2006-2008: collapse of the sponsorship constellation

In early 2005, changes in the sponsorship constellation of the HRDP started to create uncertainty about its future. The first 5-Year Program of Work would end in June 2006 and the expectation had always been that the Netherlands government would fund another five-year period.

A number of changes heralded the breakdown of the sponsorship constellation that supported the research program. In the Netherlands, a new Minister for Development Cooperation had been appointed who was less interested in research and disbanded the Development Assistance Research Council (RAWOO), which had always supported the HRDP. A second change was that decision-making about development programs was decentralised from the Ministry of Foreign Affairs in the Netherlands to the local embassies in recipient countries. In addition, the official at the Netherlands embassy in Ghana with whom the program secretariat had always interacted was replaced by someone else.

The new embassy official was initially very critical of the HRDP. The new official was unfamiliar with the RAWOO and had little knowledge about the origin and functioning of the research program. In an interview about the program, the new official started out with arguing that health research in countries such as Ghana was too much oriented towards international scientific publications, instead of local needs and contributing to action. Soon after, the new official announced that the embassy would not continue to fund the HRDP in its current format because it had to focus on Ghana itself and did not consider the funding of a North-South research collaboration as part of its mission.

While the future of the HRDP was uncertain and no new call for proposals was permitted, the program was allowed to use the remaining budget to continue to support the ongoing research cycles. The 31 studies that were selected for funding in 2005 started in 2006. Research teams were invited to an orientation workshop, received targeted on-site support and could participate in workshops for data analysis and report writing and final reports were printed and disseminated.

In September 2008, the curtain finally fell on the HRDP. A two-day dissemination meeting was held in the capital Accra. The program management invited journalists to cover the event and asked the Ghanaian Minister of Health to speak about health research in Ghana. The Dutch evaluation team that had continued to assess the use of research was invited to present their results and an official from Netherlands Embassy would explain its decision about the financial support for the research program.

The two-day meeting showed that the HRDP had helped to further develop the Ghanaian research community and strengthen the role of health research in Ghana. The meeting was attended by nearly 200 participants and over 40 studies were presented and discussed by researchers, policy makers and other research stakeholders. In his speech, the Minister of Health emphasised the importance of health research in Ghana and leading national newspapers covered the event. Participants at the meeting described how during the past years, the perception of research within the health sector had changed. A policy maker told how research was increasingly valued within the Ministry of Health: *"People start to recognise that research is critical."* A director of the Ghana Health Service who was interviewed at the meeting described something similar: *"It is making a difference, because it is there, now there is a focus. You now see a group of people who put appreciation and a premium to research. So already we are beginning to see a research culture, a growing idea that research is relevant to the system. Without this program this would not be there. People are interested in PhDs and the HRU* (Health Research Unit) *has got a very positive* *image."*

The assessment of the use of research provided further evidence of the success of the research program. Within 12 months after their finalisation, the results of 20 of the 30 assessed studies were translated into action [30]. Compared to other research programs, this number seemed high. Analysis of how and why research had been used suggested that the program strategy, with its emphasis on demand-driven and locally-led research, was an important factor behind this success rate.

While the new official at the Netherlands embassy had become more positive about the research program and recognised its success, he still announced that the Netherlands government would end the direct funding of the HRDP. The new official described the 2005 Paris declaration on Aid Effectiveness as the main reason for not continuing the direct funding. Central to the Paris declaration was the commitment to help the governments of developing countries formulate and implement their own national development plans, according to their own national priorities, using, wherever possible, their own planning and implementation systems. Keywords were ownership, alignment and harmonisation. Aid had to be pooled in support of a particular strategy led by a recipient country—a national health plan, for example—rather than being fragmented into multiple individual projects. For the new embassy official, this meant that the HRDP should no longer be funded as a separate program. Instead, all funding should be provided to the Ghanaian government as part of multi-donor budget support for the health sector. National priorities should determine if the money was to be allocated to health research. This decision brought an end to the formal existence of the Ghanaian-Dutch Health Research for Development Program.

The official of the Netherlands embassy presented this decision as a new phase in the development of health research in Ghana. Ghanaian researchers were critical in their response to the idea that this was a new phase. They pointed out that for years, local researchers had lobbied with the government for a reasonable budget for research. The Ministry of Health had always welcomed the idea, and even pledged to allocate 5% of the budget of the Ghana Health Service to research, but had so far not provided additional funding. At the 2008 dissemination meeting, an official of the Ministry announced that it would establish a budget line for research and was planning to play a larger role in health research. When, at the meeting, a critical researcher asked about the budget plans of the Ministry, the official admitted that it was unlikely that new funding would be allocated to research in the 2009 budget plan.

During an interview in early 2009, we asked two officials from the Ministry of Health why the Ministry had not increased its funding for research. The participants explained that, while research was seen as important, senior staff at the ministry considered research a domain for which a lot of international funding was available. *"Before the Dutch, we had the British and the Swedes, and now there is a lot of American funding, you know, USAID, Gates. There is the WHO and Global Fund and there are many others".* The participants explained that, while funding for research seemed available, the Ministry was constantly struggling with a lack of resources and an uncertain stream of donor-driven funding and changing development trends. As a result, those in charge at the ministry had a strong preference for investing in concrete projects with clear short-term results.

Without a realistic budget for demand-driven and locally-led research, the organisational arrangements that were set up to run the demand-driven research program were not maintained. Core staff of the program continued to lead the existing Health Research Units, secured new research grants from international and donor agencies and moved on to new positions and other organisations.

Discussion

The aim of this study was to analyze how a program for demand-driven and locally-led research in Ghana, which was supported by a North-South collaboration with the Netherlands, came into being and functioned in practice.

The results show how the development of the research program started in the early nineties in the Netherlands, with the construction of a sponsorship constellation. After showing the problems with traditional research collaboration, an advisory council formulated a vision for a more equal and effective approach to North-South collaboration. Together with Ghanaian partners, this vision was turned into a proposal for a Ghanaian-led program for demand-driven and locally-led research, which was funded by the Netherlands government in 2001. Research priority setting showed that there was a true need for demand-driven research. After a slow start, the number and quality of the proposals that were submitted rapidly increased and the program became increasingly successful in generating, funding and supporting demand-driven and locally-led research.

The third part of the analysis shows how, despite the strong performance of the program, its role in supporting locally-led research and the use of the results, the research program came to an end in 2008 because its sponsorship constellation in the Netherlands collapsed and attempts to mobilise new funding in Ghana were unsuccessful.

The struggle that emerged in the Netherlands when development funding was allocated to research that would be led by researchers from the South is remarkable, but not unique. There are several studies that show how the interests, priorities and actions of researchers from the North can constrain the development of demand-driven research in low-income countries (Chu et al. 2014; Jentsch and Pilley 2003; Vasquez et al. 2013). For decades, researchers from the North who work in low-income countries have used development funding to do the research that they believe is needed most. After years of rising research capacity in the South, development funding can also be used to fund locally-led research. This leads to competition over priorities and limited resources. While investing in Southern-led research seems more effective and efficient from a development perspective, researchers from the North continue to play a dominant role in global health research and have much better access to development funding (Rottingen et al. 2013; Sheikh, George, and Gilson 2014). The demand-driven program approach of the HRDP provides a model for North-South collaboration that increases the role of Southern researchers, strengthens local capacities and institutions and invests in research that is aligned to local needs and likely to be used to improve local action.

The Ghanaian national research agenda shows that there was a true need for demand-driven research. The local research needs, which were mostly related to health systems, differed substantially from the disease-specific, biomedical studies that foreign researchers and funders were mostly interested in. The stark disagreement between international and national research priorities shows why countries need to set their own national research agenda and provides support for those who promote priority setting worldwide (Pratt, Merritt, and Hyder 2016; Tromp and Baltussen 2012; Viergever et al. 2010).

Besides the difference in priorities, the Ghanaian research agenda also shows that there was a strong need for locally specific research. While national research agendas in countries around the world show a similar need for locally specific research, there is little attention for such research in the current discussions about research for global health (Kok et al. 2012; Ochola and Gitau 2009).

International agencies, funders and the scientific community tend to focus on disease-specific research that aims to produce universally valid knowledge claims (Rottingen et al. 2013).

While this universally-oriented research can lead to useful insights and innovations, it provides at best a small part of the knowledge that is required for improving health in the South. The one-sided focus on producing knowledge that is intended to be universally valid and applicable leads to a neglect of more locally specific research that policy makers, health professionals and community representatives in low- and middle-income countries say they need to improve action for health.

A largely neglected challenge is finding the right balance between more locally-specific and more universally-oriented research. When trying to find this balance, it is essential to look beyond the promise of universal applicability of research findings, and analyze the extent to which the research that is funded is actually used to contribute to action for health (Greenhalgh et al. 2016; Kok and Schuit 2012).

An important lesson from the HRDP is that the research capacity that existed in Ghana was much larger than it seemed in the first years of the program. Surveys of research capacity, analyzes of numbers of publications and 'calls to action' consistently suggest that the research capacity that is present in the South is relatively limited (El-Jardali et al. 2011; Gonzalez Block and Mills 2003; Rottingen et al. 2013). The idea that research capacity is limited is used to support investments in capacity strengthening programs and legitimise the substantial role that foreign researchers continue to play in these countries (Chu et al. 2014; Jentsch and Pilley 2003; Ochola and Gitau 2009; Wight 2008).

The experience of the HRDP shows that in Ghana, a substantial, but partly latent reservoir of professionals with relevant research skills was present. A substantial part of this reservoir does not appear in lists of publications or formal research positions, because it showed itself only after a regular funding opportunity for locally-led research was available. The existence of a latent reservoir of research capacity is not explicitly described in the literature about capacity strengthening, but is not surprising. For years, researchers from low-income countries have argued that the lack of funding for locally-led research is the main reason why they did not continue to work in research (Edejer 1999; Hyder et al. 2003; Ochola and Gitau 2009; Vasquez et al. 2013). While training new researchers is needed in every research system, our study shows that the key to strengthening research capacity in countries such as Ghana is to increase the funding that is available for locally-led research.

To mobilise local capacity for demand-driven research, a set of well-functioning local institutions and networks is required. In Ghana, the HRDP benefitted from the support of leading policy makers in the health sector and an existing research tradition and infrastructure upon which the institutions for demand-driven research could be constructed. Despite these conducive circumstances, those who ran the program still had to develop, try out and improve new procedures, norms and rules for making the program function as intended. As others have shown, realising a well-functioning demand-driven research programs requires a long-term perspective, careful and inclusive preparation, and sufficient resources, capacities and time for developing the required procedures, infrastructure and networks (Varkevisser, Mwaluko, and Le Grand 2001; Wehrens, Bekker, and Bal 2014).

An important finding is that the research that was funded was often used to contribute to action (Kok et al. 2016). The detailed analysis of which studies were used and why showed that the use of research was related to the demand-driven approach, and especially the fact that research was initiated and led by local researchers, who aligned their research towards specific needs and local circumstances and played a role in the translation of knowledge into action. This shows that the strategy of the program, to support demand-driven and locally-led research, was working as intended.

As a final result, our study provides insight into the critical role and dynamics of sponsorship constellations. While the importance of political, societal and especially financial support for research is widely acknowledged, there are very few empirical analyzes of how such support emerges, stabilises and functions, especially in low- and middle-income countries. Inspired by others, we undertook a multi-level analysis and introduced the notion of a sponsorship constellation to refer to the network of actors that mobilises funding for a research program and legitimates its role in society (Rip 2002). The analysis provides some insight into how such a sponsorship constellation came into being, fulfilled its role and fell apart, which is perhaps also relevant for those who manage knowledge translation platforms, communities of practice and learning networks in global health (Bertone et al. 2013; El-Jardali et al. 2014).

Our multi-level analysis shows that, while the HRDP succeeded in realising a well-functioning research program in Ghana, it remains risky when such a program depends on a single sponsorship constellation that is located in a foreign country. An essential and rarely studied question is how local sponsorship constellations for demand-driven research programs can be established in low- and middle- income countries. On several occasions, ministers of health from African countries and elsewhere have pledged to allocate at least 2% of their national health budgets to health research (WHO regional committee for Africa 2016; World Health Organization Regional Office for Africa 2008). While some countries have increased their investments in research, the sparse data that is available indicates that the funding that is allocated is nowhere near the pledged amount (Rottingen et al. 2013). The description of how the sponsorship constellation for the HRDP was forged in the Netherlands may provide some indication of the time it may take and the kind of the efforts that may be required to realise such constellations.

Considerations for research policy

Our analysis allows us to formulate some suggestions for those who aim to strengthen the functioning of research in low-income countries and elsewhere.

A first suggestion is to increase the funding for demand-driven and locally-led research in low- and middle-income countries. Worldwide, over 240 billion USD is spent annually on health research (Rottingen et al. 2013). While only a small percentage of this seems directly relevant for health in low-income countries, this fraction is still mostly spent on disease-specific research that is prioritised internationally and initiated and led by researchers from the North. Even if only 0.1% of the global investment would be shifted towards demand-driven and locally-led research in low-income countries, this would result in a fundamental change in the research landscape in these countries, an enormous boost for local capacity and a substantial increase in locally relevant research that is likely to be translated into action for health.

A second suggestion is to consider a 'demand-driven program approach' as a strategy for strengthening research capacity in the South. During the past decades, a variety of approaches for research capacity strengthening have been promoted, particularly with respect to training individual researchers and developing and strengthening research centers and systems (Pang et al. 2003). Our analysis shows the merits of developing a nationally embedded program for demand-driven and locally-led research, which all countries ultimately need (Ghaffar et al. 2017; Hasnida et al. 2017).

Some advantages of a 'demand-driven program approach' are that it orients research to local needs, helps to strengthen and mobilise local capacity and institutions, and provides a clear aim for which different components most be realised.

A third suggestion is to increase the attention for realising the local sponsorship constellations that are required for demand-driven research programs. To move beyond dependency on unpredictable foreign funders and create sustainable research programs, it is essential to construct local sponsorship constellations that generate sufficient funding. While forging such constellations requires a locally-led process, international agencies can perhaps provide some financial and technical support, by sharing lessons learned in other countries, for instance. To encourage and support governments to develop such local sponsorship constellations, international funders could offer co-funding for demand-driven research programs (Kok and de Souza 2010).

Limitations

The main limitation of this study is that we started the data collection process in 2005. To reconstruct the long preparatory process, we had to ask participants about events that happened several years prior to our first interviews. We tried to prevent recall bias by checking claims with the extensive documentation of the preparatory process, which included several reports and a detailed process description that was written by one of the participants.

Conclusion

Our study shows that developing a program for demand-driven and locally-led research in a low-income country provides an effective approach to North-South collaboration. The research program that was developed in Ghana generated, funded and supported demand-driven and locally-led research, of which the results were often used to contribute to action. The program helped to strengthen local research capacities, institutions and networks. More attention is needed for realising the local sponsorship constellation of research.

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Chapter 11

Discussion: towards more reflexive and responsive knowledge practices for health

Discussion: towards more reflexive and responsive knowledge practices for health

In the introduction to this thesis, I laid out that, while research has contributed enormously to improving public health, and global investments in research grow rapidly, there are continuous reports of disappointments and problems with the relevance, acceptance and the use of research. While the promises and expectations about the benefits of research continue to grow, it remains difficult to realize the contribution of research to better policies and practices, more useful innovations and ultimately to better health.

I then described that in the health sector, all kinds of attempts have been made to address the problems and disappointments with the contribution of knowledge production to action (KtA) for health. Initially, these efforts focused on improving the communication of research results to intended users. While important, improving communication also proved insufficient. A second generation of KtA approaches focused on improving interaction between researchers, users and other stakeholders. Through sustainable interaction, the various actors and communities that played a role in the production and application of knowledge could be linked up, gain insight into each other's needs, perceptions and values and coordinate their practices. As part of these interaction approaches, stakeholders were involved in setting research priorities, conducting research, and interpreting and applying results. When these interaction approaches also proved to be too limited, a third generation of KtA approaches was developed that attempted to take into account the entire system of actors, infrastructures and institutions involved in the production, transfer, synthesis and use of research.

Although these new KtA approaches contain all sorts of valuable elements, the problems and disappointments with the relevance, acceptance and the use of research hardly seem to diminish. A possible explanation for the persistence of these problems and the limited success of new generations of KtA approaches is that the promises about the benefits of research, the analysis of the problems with KtA and the new KtA approaches implicitly or explicitly build on a too simplistic perspective on how the production and use of knowledge can contribute to better action for health. The aim of this thesis was to explore how a richer perspective, based on empirically grounded insights into producing, assessing, transferring and using knowledge, can be used to improve the contribution of knowledge practices to action for health.

In chapter two, I laid out an empirically ground perspective on the nature and dynamics of knowledge and KtA processes. This pragmatist process perspective, which is rooted in pragmatism and constructivism, offers an alternative to the incomplete KtA myths that implicitly or explicitly underpin many existing KtA approaches. The process perspective shows how, based upon a limited number of local experiences and observations, and experiments of a limited scope, knowledge can be constructed that has some validity at other times and places. In this perspective, knowledge is not a fixed and external product, but a dynamic part of a continuous process of knowledge acquisition and use, and ongoing work that is required to make knowledge generalizable and applicable at other times and places. These processes are always linked to a practice and embedded within a community. The process perspective emphasizes that, while knowledge always aims at a certain generality, action for health is concrete and locally specific. To use knowledge, it has be translated back from the generic to the locally specific. Knowledge thus has to be made locally applicable. Users combine knowledge elements from different sources, and articulate what this knowledge means for their own aims in their own situation.

In chapter four to nine, I presented a series of empirical studies into concrete attempts to strengthen KtA processes in three different countries and a method to assess the contribution of research to action. In the Netherlands I analysed an "Evidence Based" approach for the central assurance of the quality of health promotion interventions. In Guinea-Bissau I studied an approach for strengthening a national health research system and in Ghana I studied an ambitious program for demand-driven and locally-led research, that was supported by researchers and funding from the Netherlands. Each of the cases shows that, while the attempts to strengthen KtA processes contained all kinds of useful elements, problems and disappointments with KtA persist. In the empirical studies, I explored how elements from the process perspective can help to analyse and understand these problems with KtA and design concrete advice and new approaches that are intended to be more productive. In each of the separate chapters, I have discussed the scientific and practical implications and the strengths and weaknesses of these studies.

In this final chapter, I return to the questions I formulated in the introduction. First, I will briefly discuss the extent to which the KtA myths were present in the KtA approaches that I have analysed in the Netherlands, Guinea Bissau and Ghana. I will then discuss some explanations for the persistence of these KtA myths and their implications for the use of the process perspective. In the second part, I explore the added value of the process perspective. I discuss how the insights into the nature and dynamics of KtA processes shed new light on four much-discussed problems with KtA: 1) disappointments and problems with the use of research, 2) combining knowledge from research with knowledge from other sources, 3) the trade-off between the substantiation and the applicability of knowledge; and 4) the limitations of central quality assurance.

In the third part, I discuss key insights and lessons that arise from the empirical chapters and their implications for both understanding KtA processes and for attempts to improve their functioning and productiveness. I start this third part with the explicit characterization of the translation of knowledge into action, and its implications for understanding and improving the use of knowledge. Next, I discuss the search for a balance between locally specific and more generically oriented knowledge production. I continue with discussing the various actors and communities that play a role in KtA and the way in which KtA is influenced by larger structures and dynamics in the context. I then discuss the importance of a reflexive and responsive approach, in which organized KtA processes are monitored and adapted with the aim to improve their productivity. Finally, I explore some possible implications of the insights in this thesis for the further development of the Evidence Based movement, and the organization of knowledge practices and learning processes for health.

Part 1. The presence of the KtA myths in the three cases

A first question that I formulated in the introduction was to what extent the KtA myths are visible in the concrete KtA approaches that I have analysed in the Netherlands, Ghana and Guinea Bissau. The empirical analyses show that, in each case, elements of the KtA myths were, implicitly or explicitly, present in the attempts to improve KtA processes.

In the Netherlands, the designers of the Effectiveness Recognition System focused on assessing the effectiveness of interventions, but paid little attention to the larger system of actors, practices and structures that was needed to make this linear KtA strategy work. They considered interventions as fixed products and assumed that the interventions assessed had an inherent quality. At the same time, they ignored the work, the circumstances and the resources needed to realize the same 'effective' interventions elsewhere. They also ignored that there was never going to be enough budget for the required effectiveness studies, that there were no shared norms for the relevance of intervention effects and the best way to measure them, and no shared set of concepts to interpret these effects.

The National Health Research System approach used in Guinea-Bissau takes into account more actors and factors, but focuses entirely on the production of new research-based knowledge. Although the NHRS approach is explicitly intended to organize research so that it contributes to better action, the NHRS approach ignores the work required to make knowledge locally applicable, and the active role that users, local resources and circumstances play in applying results. This approach also ignores the so-called sponsorship constellation that is involved in legitimizing the role of research and mobilizing resources for research.

The developers of the research program in Ghana paid explicit attention to the set of institutions and networks that are needed for demand-driven and locally-led research. As in Guinea-Bissau, there was no explicit perspective on how results would be applied in action and the program management paid little attention to the active role that users and their circumstances play in applying results. Those involved also ignored that the program was financially dependent on a sponsorship constellation in the Netherlands and did not attempt to mobilize other international or local funding. Ignoring this dependence proved fatal when the sponsorship constellation in the Netherlands fell apart and the successful program came to an end.

Overall, the results of the empirical analyses are in line with to the problem diagnosis in this thesis, which stated that existing KtA approaches in the health sector are characterized by both successes and continuous reports of problems and disappointments, and are, implicitly or explicitly rooted in the KtA myths.

Why are the KtA myths present in these KtA approaches?

An interesting question is why the KtA myths are present in these specific KtA approaches. STS scholars, sociologists and philosophers of science have shown that there are various reasons for the continuous presence of the KtA myths.

A first reason is that KtA processes are often complex and that when, retrospectively, attempts are made to explain how these processes went, the complexity of these processes is considerably simplified. Scholars such as Bruno Latour have shown in detail that the post-hoc success stories that are told about KtA processes rarely form a realistic representation of how these processes actually went. In the simplified post-hoc narratives, there is often a single hero (e.g. Pasteur) who conducts a crucial experiment or has a brilliant eureka moment, which results in an essential insight that then leads to all kinds of improvements (Latour 1993a) . While these linear success stories highlight some important aspects of KtA processes, they tend to ignore that the development and application of a new knowledge construct is often a complex, interactive and gradual process, in which multiple developments come together and to which numerous people and all kinds of social and technical resources and circumstances contribute over time.

A second reason for the persistence of the KtA myths is that they provide arguments for the actions of researchers and for those who invest in research (Bijker, Bal, and Hendriks 2009; Wehrens, Bekker, and Bal 2011, 2014). By presenting research as the point-source of improvement, and assuming (or pretending) that this knowledge is inherently valid and universally applicable, researchers, funders and their supporters legitimize their actions to the outside world (Gieryn 1999; Latour 1993b).

A third reason for the continuous presence of the KtA myths is that they are linked to the action perspective of those who attempt to directly contribute to societal change through research. These KtA insiders cannot address all activities that are part of a KtA process at the same time. The complexity of KtA processes forces them to take a step-by-step approach (Deuten, Rip, and Jelsma 1997; Hessels, van Lente, and Smits 2009). As I have shown in chapter 2 (following Deuten 1997), their action perspective quickly leads to a concentric approach, whereby the perspective of KtA insiders and the knowledge product that they develop become the focus, rather than the needs of others, such as intended users and their needs and aims in their specific situation.

There are thus several reasons for the persistence of the KtA myths and it seems likely that these myths will continue to be reproduced in the future. When positioning and applying the process perspective, one could try to take into account the ongoing presence of these myths, the role they play and the mechanisms that sustain the KtA myths. The process perspective can be positioned as a more complete understanding of KtA processes, which may help those who seek to better realize the intended benefits of investments in KtA.

Part 2. The added value of the pragmatist process perspective on KtA

The next question was to what extent the pragmatist process perspective leads to a different and more useful understanding of recurring KtA challenges in the health sector. In the second part of this discussion, I try to answer this question by zooming in on four prominent KtA challenges that were visible in the empirical cases and that may help to provide insight into the usability of the pragmatist process perspective. These four KtA challenges are: 1) disappointments with the use of research, 2) integrating knowledge from research with knowledge from other sources, 3) the role of central quality assurance, and 4) the trade-off between the substantiation and the applicability of knowledge.

Disappointments and problems with the use of research

The process perspective leads to a more nuanced understanding of the problems with the use of research. In the health sector, numerous reports conclude that there is a lot of useful research that is insufficiently applied and that faster bridging of the gap between 'knowing' and 'doing' can lead to significant health gains (Attaran et al. 2004; Brownson et al. 2006; Davis and Howden-Chapman 1996; Haines, Kuruvilla, and Borchert 2004; Institute of Medicine (US) Committee on Quality of Health Care in America 2001; Jansen et al. 2008; Lewis 2005; Ritchie and Keech 2001).

The process perspective and case studies show that, while it is important to identify these gaps and promote the use of relevant knowledge, the analyses that support these gaps rarely take into account the nature of knowledge and the way in which knowledge is translated into action. The process perspective makes clear that claims about know-do gaps are always linked to ideas about what results mean for action, tend to ignore the local and tacit aspects of knowledge and the work that is required to make knowledge locally applicable, and contain assumptions about the circumstances in which knowledge must be applied.

The analysis of the Center for Healthy Living (Chapter 4 and 5) illustrates that the opinions of researchers about the relevance and usability of results are often taken as a starting point, while the opinions of others, such as citizens, health professionals and policy makers are easily ignored. Neglecting the needs, interests, aims and opinions of intended users, and the situation in which knowledge must be applied, can lead to problems. The utilization that occurs is not a matter of the strength of research knowledge, but of how users take up and combine knowledge elements from different sources and use them for their own purposes in their specific situation.

An additional challenge is that to identify and reproduce situations in which knowledge is applicable, one needs to know about the situation in which knowledge is valid. The case study in chapter four illustrates that the codified knowledge about a 'best practice' that is transferred to potential users is only a small part of the story of the original configuration (e.g. intervention). It worked because other elements were present, including competent actors who understood the local situation, and had the know-how required to make the configuration work. This knowledge and these competences are at least partially tacit and locally specific, and cannot easily be transferred and 'downloaded' into new situations.

Several initiatives try to increase the use of research by involving users in interpreting results, and developing actionable messages (Lavis et al. 2003). The process perspective shows that, to communicate action-oriented messages effectively, interaction and trust are needed, and a relevant communicative infrastructure that helps experts and codified knowledge to travel and interact. Scientists have organized such interaction and infrastructure for their own practice, through conferences, journals, visits to laboratories and codifying measures and protocols (Latour 1987). Effectively transferring and sharing knowledge to other, non-scientific communities requires building up and maintaining further networks for interaction and a relevant communicative infrastructure for these communities. In addition, attention must be paid to the active role of the user, and the competences and circumstances that are needed to make knowledge locally applicable. I will return to this later in this discussion.

If, relevant experts are convinced that translating evidence into action could yield significant benefits, it may be useful to propagate the application of results in an assertive way. Those who promote the use of results should take into account the competencies, efforts, resources and circumstances that may be needed to use results in specific situations and the values, interests and goals of those involved. In some cases, a technocratic approach, in which a closed group of researchers and decision makers dominate KtA processes may be acceptable. When KtA processes fail, because findings are not accepted or lead to controversy, a more participatory approach and a broader social dialogue focusing on consensus forming may be needed (Lindblom 1965; Stiglitz and Greenwald 2014).

The process perspective thus emphasizes that bridging a know-do gap is not just a matter of sending the right messages to intended users, but requires the built up or existences of a communicative infrastructure, ongoing interaction, trust, and efforts and competences to make knowledge applicable in new situations. Depending on the specific situation, the parties involved must find the right balance between a bold push to apply essential findings, and a more modest approach in which insights are offered to potential users, in a way that reaffirms their autonomy and supports their capacity to learn. Attempts to improve the use of existing knowledge should not be seen as a one-way movement from 'knowing' to 'doing', but as a process of joint learning, which is part of the effort to achieve the best possible action for health in local situations.

Combining knowledge from different sources

A second KtA challenge is combining knowledge from research with knowledge from other sources. The process perspective and the empirical cases in this thesis illustrate that, although research can yield valuable results, the knowledge resulting from research can never be sufficient to base action upon. Targeted action requires competent actors and all kinds of knowledge elements, such as knowledge about the local circumstances, knowledge about how the complex world works and how to intervene, about which actions are desirable and possible in the specific circumstances and what effects they have. These diverse knowledge elements come from various sources, such as experience in concrete situations, interaction with others, education and sometimes from scientific research. These knowledge elements do not exist as separate packages, but only as a dynamic part of a process of knowledge acquisition and use, that is linked to a practice and a community and related to a larger system of knowledge, values, interests and institutions.

The founders of the Evidence Based movement already emphasized that knowledge from research alone was insufficient as a basis for targeted action (Bluhm 2005; Sackett 1989; Sackett et al. 1996). They described Evidence Based Practice as the integration of clinical expertise, patient values, and the best research evidence into the decision making process for patient care (Sackett et al. 2000). The founders thus acknowledged that generic evidence in itself could never form a sufficient basis for actual practices. Several scholars have argued that therefore, the approach that the movement promoted can better be referred to as Evidence *Informed* Practice (Glasziou 2005).

The practices, methods and organizations that were developed and promoted by the Evidence Based movement, focused almost entirely on producing, bringing together and valuing explicit knowledge claims that stemmed from a specific type of research (Berwick 2005). While the movement promoted the production and application of this specific type of research knowledge, its proponents paid little attention to developing a broader perspective on knowledge, which was applicable to knowledge from different sources and took into account the way in which doctors, patients, policy makers and others, integrate codified and tacit knowledge elements and use them for decision-making in specific cases (Raad voor Volksgezondheid en Samenleving 2017).

The combination of simultaneously recognizing and ignoring the role of knowledge from different sources has led to difficult questions and problems since the emergence of the Evidence Based movement. The developers and users of scientific advice, guidelines and protocols increasingly acknowledge that, to support action in specific contexts, scientific and other knowledge must be carefully interpreted, weighed and integrated, taking into account locally specific goals, values, interests and circumstances (van de Bovenkamp and Zuiderent-Jerak 2015; Wieringa et al. 2018; Zuiderent-Jerak, Forland, and Macbeth 2012). However, it remains unclear how different knowledge elements relate to each other and can be consciously integrated and how the quality of knowledge from non-scientific sources can be assessed.

The process perspective may help to better deal with these challenges, by showing that there are general patterns that can be identified in the way knowledge is acquired, which are valid for knowledge based on scientific research and for knowledge based on other sources. The distinction that is made, does not arise from a fundamental difference between different types of knowledge, but depends on the way in which knowledge has been acquired and the people and institutions involved.

Recognizing that knowledge from different sources does not differ in principle from one another, creates room for a more pragmatic analysis of the process through which knowledge has been acquired, the way the quality of knowledge is appraised and the implicit and explicit methodological and normative assumptions that knowledge is built upon. Starting from such a pragmatic analysis, the strengths and weaknesses of knowledge claims from different sources can be taken into account when using knowledge to support decision-making.

The trade-off between the substantiation and the applicability of knowledge

A third KtA challenge is the trade-off between the substantiation and the applicability of knowledge. The process perspective and the empirical cases show that the validity and applicability of knowledge must be seen in relation to the practices and circumstances in which knowledge is produced and in which it will be applied later or elsewhere.

An important consequence of this relationship is that there is a trade-off between the pursuit of knowledge whose validity can be substantiated as well as possible, and the applicability of knowledge in daily practices (Toulmin 1976). Controlling and standardizing the circumstances of knowledge production (e.g. in a lab or RCT) helps to better substantiate the validity of knowledge, but limits the scope and applicability of the knowledge produced, because the validity of this knowledge is dependent on the controlled circumstances in the research situation.

The challenges and problems arising from this trade-off are clearly visible in the discussions about the pros and cons of Randomized Controlled Trials, which have been promoted by the Evidence Based movement for decades. This trade-off is also clearly visible in the analysis of the Effectiveness Recognition System. The methodology of the ERS strongly focused on the substantiation of the effectiveness of interventions. The few interventions that were approved as 'proven effective' were described by intended users as unusable, because the reproduction of these interventions required too much work, resources and adaptation of local situations.

A better understanding of the trade-off between the substantiation and applicability of interventions, including the advantages and disadvantages of research in controlled circumstances, seems very relevant for organizations involved in producing, appraising and promoting the use of research knowledge in the health sector. For decades, organizations such as the Cochrane Collaboration have focused almost exclusively on producing the best possible evidence. More recently, these organizations are starting to take steps to try to improve the application of research findings. Instead of automatically considering research under controlled conditions as superior, it seems more productive to recognize that there are different ways to acquire robust knowledge, each with their own advantages and disadvantages. While useful research and evidence appraisal methods have been developed, it is not possible to specify a priori which way of acquiring knowledge is best, as this depends on the goals, resources and circumstances in the specific situation.

The limitations of central quality assurance

A fourth KtA challenge that has been the subject of much debate in the health sector is the extent to which the quality of knowledge can be guaranteed centrally. The basic insight that the validity and applicability of knowledge is not an inherent property of a knowledge claim, but dependent on a local situation leads to a different understanding of the role of the central assurance of the quality of knowledge, which forms a prominent part of the Evidence Based movement (Raad voor Volksgezondheid en Samenleving 2017). While scientific quality criteria can be useful, quality assessment should become pragmatic and take into account the relevance to the purpose at hand. This implies that quality assessment cannot be the prerogative of the scientific community.

The process perspective and the empirical cases show that, while it can be useful and efficient to assess the quality of knowledge at a central location, such assessments offer at best only limited certainty when acting on the basis of this knowledge. Philosophers of science have long argued that, logically, it is impossible to guarantee the quality of knowledge centrally, because the quality of knowledge always depends on what is happening in a local situation (Sismondo 2010). As the case study of the Effectiveness Rating System clearly illustrates, the adaptation of local situations, which is required to make knowledge valid and applicable, may be constrained by the lack of local resources, diverging perspectives of what matters and limited opportunities and willingness to transform local situations. An additional challenge is that the world is constantly changing, and thus also the circumstances in which knowledge claims must be *made* valid and applicable. In addition, there is also the essential problem that while attempts can be made to control the circumstances in which knowledge is produced, it is impossible to control for what is not known. As a result, it is never clear whether the circumstances in new situations later or elsewhere, are sufficiently similar. Those who seek to rely on the robustness of knowledge to support routine action should take into account the inherent uncertainty of knowledge, and develop their ability to identify situations in which knowledge is, or is not, valid and applicable.

The analysis of the Effectiveness Rating System illustrates that, while it may be useful when experts centrally assess the quality of knowledge products, an important part of quality assurance must take place in the local situations in which interventions are realized. To take into account what is desirable and possible in local practices and circumstances, more inclusive, distributed and heterogeneous forms of quality assurance are needed, in which various stakeholders play a role and where feedback from local lessons is provided to a more central knowledge reservoir. The challenge is to find the right balance between the elements of interventions that have to be realized (and learned) locally, and the elements that can produced through more centrally organized research, learning and development processes.

Part 3. New insights and methods for analysing and improving KtA processes

So far, I have discussed the presence of the KTA myths in the KtA approaches in the Netherlands, Guinea Bissau and Ghana and touched upon three reasons for this presence. I then tried to demonstrate that the pragmatist process perspective leads to a different understanding of prominent KtA challenges in the health sector, and may lead to new ideas and approaches for dealing with these challenges in a constructive manner.

In the third part of this discussion, I will discuss the implications of the new insights and methods that arise from this thesis.

A characterization of how knowledge is translated into action

In the introduction, I laid out that while the Evidence Based movement aimed to promote the use of knowledge, it did not develop an empirically grounded perspective on how knowledge is used and plays a role in action in specific situations. An important result of this thesis is the empirically grounded characterization of how the translation of knowledge into action proceeds.

The empirical analyses show that there are two, somewhat linked dynamics that are present in the translation of knowledge into action: a first dynamic in which those involved lay out what knowledge elements mean for action in a given situation and new knowledge acquires meaning in relation to an existing knowledge repertoire, and a second dynamic in which these knowledge elements are mobilized in concrete actions and offer coordination. These dynamics do not take place in a vacuum, but are embedded in an evolving world full of actors with diverse aims and interests and existing knowledge, practices, structures and ongoing change processes (Chapter 9).

A strength of this characterization of how knowledge is translated into action is that it takes into account that ‘action’, such as treating a patient, formulating a new policy or implementing a health promotion program, has its own dynamic, in which, depending on the situation, knowledge from various sources may be used and play a role. Recognizing that action has its own dynamic helps to break free from the supply-driven approach which is central to most of the literature about research use in the health sector. At the same time, this characterization shows *how* knowledge, local or from elsewhere, can actually play a role in action for health.

The practices of the Evidence Based movement have focused mostly on producing and appraising the best possible research findings, and translating these into guidelines that should support action. There has been less attention to the role that knowledge reservoirs and repertoires play, as links between the production and application of knowledge in practice. An interesting exception is a study by Gabbay et al, who observed that healthcare professionals hardly use formal guidelines (Gabbay and le May 2004). Instead, the professionals that they observed used internalized, informal 'guidelines' which Gabbay et al refer to as 'mindlines'. During the past decade, these observations have inspired several other studies that show the role of 'mindlines' (Wieringa and Greenhalgh 2015).

In the characterization of the translation of knowledge into action that I present in this thesis, I refer to repertoires, instead of mindlines. Mindlines can be seen as elements of a knowledge repertoire. The term 'repertoire' refers to a more general phenomenon that helps to understand how knowledge can influence action (Swidler 1986). A knowledge repertoire contains the -more or less- stabilized and accepted, explicit and implicit knowledge that is available, such as the diagnostic classifications that doctors, or other community members use. Repertoires are interesting because knowledge elements tend to acquire a role in action through repertoires. The knowledge that is part of a repertoire drives practices, and is visible in practices. The explicit and tacit knowledge that is part of a repertoire offers coordination by making certain actions and arguments easier and hampering others. Repertoires can be built up and accumulate and are reproduced when people pick up and use elements from a repertoire and refer to these elements as something that exists by itself (e.g. the diagnosis AIDS).

The characterization of how knowledge is translated into action emphasizes that action has its own dynamic. In the health domain, there is an enormous diversity of actions, problems and circumstances, and an overwhelming variety and complexity, which shapes this dynamic. Although some actions are routine, a lot of problems in the health domain can only partially be addressed through direct application of generic decision-making rules and technical knowledge. Scholars who study the actions of professionals show how, through practical reflection in action, professionals try to address unique problems and try to deal with uncertainty and confusion. Dealing with both routine and unique problems requires specific competencies such as recognizing patterns, naming and framing what matters and building on that for further actions (Schön 1983). These competences, which are often acquired and transferred through education and experience, form an essential part of KtA processes. Further research could explore how reflexive practitioners differentiate between common and unique problems, and how they develop the competences to do so.

The balance between locally specific and more generically oriented knowledge production

A second theme in the case studies is finding the balance between locally specific, and more generically oriented knowledge production. The empirical cases show that, each time that attempts were made to use research as effectively and efficiently as possible to contribute to action for health, it became clear that a universalist-oriented KtA approach could only play a limited role. At the same time, the case studies show that there was a great need for locally specific knowledge and learning and a local capacity for synthesizing, adapting and integrating knowledge from different sources and translating it into local action.

Researchers often emphasize the potential benefits of a universalist KtA approach, whereby an attempt is made to produce knowledge that is, in principle, universally valid and generically applicable. Since resources are limited, it seems efficient to try to produce knowledge that is (or can easily become) valid and applicable for the largest possible domain, and can benefit as many people as possible.

The cases in this thesis illustrate that when research is intended to contribute to action, this universalistic KtA route can only offer a small part of the required knowledge. At the same time, the cases show that there was a need for research that took into account the specifics of local situations, such as a single district, a department of a hospital, or the population of a prison. This locally specific knowledge was not only seen as essential for improving local action, but is also required to use more generically oriented insights in new specific situations. In order to use limited research resources as efficiently as possible AND to contribute to health action, a balanced mix between locally specific and more generically oriented knowledge production and learning practices must be sought.

A recurring question in the search for this mix is for which domain and on what scale locally specific knowledge production should be organized. In recent decades, many countries have attempted to organize a stream of research that is aligned to the organization of health care in national systems (Wolffers 2000; World Health Organization 2004; Wouters 1991) .

The empirical analyses in this thesis confirm the need for, and usefulness of, research focused on national priorities in low-income countries. In both Ghana and Guinea Bissau, the locally identified research priorities differed greatly from the more generically oriented disease-focused research priorities of foreign researchers who were active in these countries. The analyses in these countries also show that focusing research on national needs, combined with the local embedding of research, helped to increase the likelihood that results were used.

These findings show that, in order to improve action for health, a diverse and distributed system of research and learning practices is needed. Key components of such a research and learning system exist, such as the academic research system, a wide variety of organizations for monitoring the health of populations, quality of care, food products and medicines, and all kinds of research and advisory organizations, that often play a role in synthesizing and mobilizing knowledge for decision-making in the health sector.

In the development of such a system of research and learning practices, a balance needs to be sought between the research and learning practices that are essential for improving local action and the production of knowledge that can be applied at the largest scale and domain. Traditional research practices and modern scientific institutions encourage research with a more generic orientation, whereby the quality of knowledge is determined on the basis of science internal quality criteria. To find the most appropriate balance, more attention is needed for strengthening the local capacities to demand, conduct, appraising and use the locally specific research that is essential for improving action for health.

The role of various actors and communities: KtA processes as joint learning in evolving networks

A third theme in this thesis, which was clearly present in each of the empirical case studies, is that all kinds of actors and communities play an active role in the production, appraisal, transfer and use of knowledge. Despite the division of tasks (researchers who produce, and the health sector who applies), the relationship between knowledge production and action should not be seen as a one-way street, but as an evolving network in which knowledge and learning practices are embedded (Latour 1993a). To improve the productiveness of KTA processes, more attention is needed for the functioning, linking and support of actors and communities that play a role in KtA processes.

A first set of actors, which requires more attention, are locally embedded researchers. According to a universalistic KtA approach, it makes little difference where researchers work, because the produced results are, after additional 'implementation' efforts, valid and applicable everywhere. The empirical cases show that, in the mix of practices needed to improve healthcare, an important role is played by research that meets local needs, takes into account the situation in which results can be used and involves people who can play a role in, or interact with, relevant decision-making processes. This locally embedded research requires locally embedded researchers.

Recently, there has been renewed interest in the health sector in stimulating local learning through locally embedded research (Cheetham et al. 2018; Ghaffar et al. 2017). The cases in chapter 9 show that there are various ways in which this locally embedded research can be realized. Research professionals can embed their studies by involving relevant users and decision makers in their research team, and/or regularly interacting with them while formulating, conducting, interpreting, and applying their research. The role of locally embedded researcher can also be fulfilled by other professionals with sufficient research skills, such as health workers, district directors or policy makers in a ministry. The case studies show that user-investigators are able to focus research on local needs and can play an important role in translating results into action.

One of the questions in this thesis was how a well-functioning and decentralized network of competent, locally embedded researchers in a low-income country can be developed and supported. A dominant idea in the aid-sector is that the development of local research in low-income countries is mainly limited by the shortage of trained researchers (Lansang and Dennis 2004; Whitworth et al. 2008). For decades, development programs have tried to reduce this shortage by training local researchers. The results in this thesis show that, at least in Ghana, the development of local research was not limited so much by the lack of competent professionals, but mainly by the lack of funding for locally led research. When in Ghana, the institutions needed for the realization of demand-driven and locally-led research were developed, and funding was available for several years, a considerable, partly latent, pool of professionals with research skills turned out to be present.

These findings suggest that when attempting to realize locally embedded research, one should start with a careful analysis of existing capacities and institutions. To gain insight into existing capacities, analyst should not just count the number of scientific publications, but also assess the presence of professionals with relevant training in research skills. Depending on such an analysis, an attempt can be made to enhance and/or mobilize existing capacities by strengthening the necessary institutions and networks and making resources available for locally-led research.

The active role of others

A recurring theme in the various case studies was that to improve the contribution of research to action, one should not just focus on the researchers, but pay more attention to the other actors and communities that play a role in KtA practices.

The empirical studies illustrate that the actions in which knowledge is used and the actors, communities and circumstances that play a role in these processes are very diverse. In health systems and beyond, decisions are made in various, partly overlapping arenas and at all sorts of interacting levels, in which knowledge from various sources is used. Experts, health professionals, patients, policy makers, media and diverse publics play a role in these arenas. In addition, knowledge plays a role in education and as element of standards, guidelines, technologies and other constructs. While attention for the interaction between research and policy processes is clearly important, a broader perspective is needed, that takes into account the distributed system of research, knowledge and learning practices that play a role in improving action for health. Such a perspective should consider the knowledge reservoirs and repertoires of those who shape action for health, the way different professional and other communities have organized activities to develop, maintain and improve these reservoirs and repertoires, and translate knowledge into action.

One can broaden this perspective even further and consider the conditions for, what scholars such as Dewey and Schon, describe as social learning in society at large (Dewey 1957; Schon 1973). Such social learning requires institutional principles that enable open dialogue, democratic debate and consensus forming, and include issues such as equal representation, freedom of speech and a free press, which articulates knowledge and ideas about health in ways which allow their widespread dissemination and facilitates public debate.

In the diverse case studies, the local ability to translate results into action appeared to be most developed in those places where policymakers, health professionals and others were involved in, or interacted with, research processes. These research practices not only led to new knowledge that was attuned to the local circumstances, but also helped to develop a network of stakeholders who considered research important and had some insight into how this knowledge was developed and related to the local situation. This involvement and interaction formed the basis for joint learning, trust and a deeper understanding that seemed to strengthen acceptance of the results and help those involved to apply the results in their local situation.

A third observation is that there were several ways to organize effective and sustainable links between the actors, communities and practices that play a role in KtA processes, such as involving intended users in determining research priorities, formulating and selecting research proposals and/or in conducting research and interpreting findings. These links help to form a network that enabled joint learning, whereby researchers gain insight into the needs and expertise of users and the circumstances in which produced knowledge is applied, and users learn to understand and value the results of research and formulate what results mean for their own aims in their own situation.

A fourth observation is that even when such links were organized, certain individuals in these networks still seemed to play a prominent role in translating results into action. These so-called 'key users' shaped the articulation of what results meant for action, initiated change actions in which research findings played a role, and made an effort to realize these changes in daily practices. Learning to identify and engage these potential key users may help to increase the likelihood that results are used. Another reason for learning to identify these key users is that the number of people that can be engaged in organized KtA processes is limited.

Together, these observations lead to an approach that simultaneously works on 1) strengthening the local research and learning competences of those who shape action for health, and 2) strengthening the networks and institutions that enable and support these practices, and 3) forging productive links between the actors, communities and practices that play a role in the joint learning processes that are needed, and 4) identifying relevant local 'key users' and engage them in KtA processes.

The influence of larger structures and dynamics on KtA processes.

The case studies show that the production, sharing, appraisal and use of knowledge is not just influenced by the actors involved, but also by the larger structures and dynamics in which KtA processes are embedded. There has been considerable attention for how such structures and dynamics shape research practices. An obvious example is the publish or perish culture, that incentivizes researchers to focus on scientific publications instead of contributing more directly to action. Another example is the NHRS approach, which focusses on research priority setting, the allocation of research funding and the development of the human and physical resources that are involved in research (Pang et al. 2003).

Context and the use of knowledge

The case studies show how the use of research-knowledge is also shaped by larger structures and change processes. The ‘knowledge for health’ literature often points to the influence of ‘context’ on the use of research results (Bekker et al. 2010; Dobrow, Goel, and Upshur 2004; Hegger et al. 2016; Moat, Lavis, and Abelson 2013). Various studies offer lists of aspects of ‘context’ that somehow influence the use of results (Greenhalgh et al. 2004; Moat et al. 2013). A limitation of these studies is that they do not offer a clear perspective on how the translation of knowledge into action proceeds. Without such a perspective, it remains unclear how the use of knowledge is influenced by these aspects of ‘context’. Implicitly, a sort of mechanical influence seems to be suggested. The characterization of how knowledge is translated into action, which I offered in chapter 9, may help to analyse more precisely how translation processes and ‘context’ influence each other.

The case studies illustrate that it is too simplistic to view ‘context’ as a list of factors that have some sort of mechanical influence on the use of knowledge. What the ‘context’ of a specific translation process was, which aspects of ‘context’ mattered and how ‘context’ had an impact was clearly shaped by those who laid out what results meant for action and those who tried to mobilize knowledge claims in concrete actions.

At the same time, the case studies show that in the context of specific translation processes, larger structures and change processes were present that influenced these specific translation processes. These structures and change processes influenced those who determined what results meant, the extent to which knowledge claims were accepted, and the mobilization of accepted insights into concrete actions. A clear example of such a larger change process in the ‘context’ is the introduction of the national health insurance scheme in Ghana, which reinforced the interest of policymakers in some studies, while they rejected other studies as no longer relevant. Another example is the pressure from the health care inspectorate in the Netherlands to use ‘proven effective’ interventions in health promotion.

While trying to stay away from the mechanical perspective on context, it seems possible to identify some more general aspects of 'context' which often seemed to influence the translation of research results into action. These aspects are 1) the alignment between research and aims of influential decision makers, 2) the presence of persons in relevant positions, who considered it part of their task to use research results and had the required translation skills, 3) the local pressure or urgency to improve action, and to use research-based knowledge for this, 4) the presence of resources that could be mobilized to realize intended translation-in-action processes. Together, these insights and observations lead to a different picture of the role of 'context', which can inform future initiatives and further analyses.

Evaluating the contribution of knowledge production to action

A fifth and final theme in this thesis is the evaluation of the use of research. To evaluate the productivity of KtA processes, we have developed Contribution Mapping. In recent decades, various methods for assessing the societal impact of research have been developed, such as the Payback framework and the Research Excellence Framework (Banzi et al. 2011; Buxton and Hanney 1996; Pang et al. 2003). While these methods have proven useful for specific purposes, a limitation of these approaches is that they do not provide insight into how users and circumstances play a role in the translation of research into action. By ignoring the active role of users and circumstances, these approaches are less suitable for analysing how KtA processes evolve and can be improved. Contribution Mapping builds on the process perspective, which emphasizes that the application of research cannot be attributed to a single actor or factor, but results from a confluence of actions, interactions and elements that together shape the translation of knowledge into action. Contribution Mapping is intended as a tool for a responsive research strategy, in which those involved are encouraged to make explicit what they aim to achieve with their research, reflect on the extent to which these aims are achieved, and gain insight into what can be done to increase the likelihood that intended benefits are realized. The iterative development and application of Contribution Mapping provides some lessons that seem relevant for the debate about assessing research use, and the organization of KtA processes in the health sector.

A first lesson is that, while it seems possible to map relevant indications of the use of research in some specific situations, the use of knowledge is a complex, diverse, diffuse and ongoing process that cannot be measured unambiguously. As a consequence, one should be modest about the extent to which the use of research can be measured and be transparent about the way data is collected. When reporting the results of Contribution Mapping, one should make explicit how respondents were selected, point out converging and diverging views and be explicit about the time frame that was assessed (Hegger et al. 2016).

A second lesson is that when mapping the use of research, it seems useful to make a distinction between the direct 'linked' use and the later and indirect, 'unlinked' use. This linked use concerns the application of knowledge by those who were involved in, or interacted with, the research process, and those with whom they interacted. In most cases, it seemed possible to construct a sufficiently convincing narrative of this is linked use. Other use processes start with unknown users who pick up results from a knowledge reservoir. While this 'unlinked use' is an important aspect of KtA, these processes are even more diverse, diffuse and difficult to identify. An additional reason for focusing on linked-use is that it is more directly shaped by how research is organized, and by what those involved do to promote the use of results.

A related lesson is that in many cases where results were used, researchers and those with whom they interact seemed to play an influential role in initiating the translation of results into action. In the cases that were studied, there were strong differences in the extent to which researchers described it as their task to play a role in applying their findings and made an effort to apply results, and had access to relevant decision-making arenas. If those who invest in research intend to contribute fairly directly to concrete action through research, more attention could be paid to the extent to which researchers and those with whom they interact, consider it their task to promote the use of the results, have the required translation skills, are encouraged to play a role in translation-in-action processes, and are able to play a role in these processes in practice (Boaz et al. 2018).

From a linear Evidence-Based, to a responsive Evidence-Informed approach

In the introduction to this thesis, I introduced the practices of the Evidence Based movement as heuristic to learn about the benefits and limitations of a linear KtA approach. Since its emergence in the late 1980s, the Evidence Based movement has continuously evolved. In addition to its linear KtA approach, with a limited focus on decontextualized knowledge products, RCTs, a hierarchy of evidence, and strict adherence to guidelines, more diverse and inclusive knowledge practices have been developed that are more reflexive and take into account more complexity and local specificity (Greenhalgh et al. 2014; Raad voor Volksgezondheid en Samenleving 2017). In the introduction, I explained that while the practices of the Evidence Based movement have evolved, its rhetoric about the nature and dynamics of knowledge and KtA processes has remained the same. I have also showed that the movement has continued to reproduce, implicitly or explicitly, the simplistic KtA myths, such as the idea that knowledge is an objective decontextualized product, and research is the point-source of improvement. In this thesis I have tried to provide a more realistic and useful understanding of the practices of the Evidence Based movement. In addition, these insights provide a reason for articulating a more comprehensive (and less risky) approach to organizing research, knowledge and learning practices for health. Before I characterize this approach, I first briefly summarize the debate about the Evidence Based movement.

Since its emergence, there has been a rich and often fierce academic debate about the pros and cons of the Evidence Based movement. In a recent article, French characterizes this debate as a struggle between a large group of proponents who are convinced of the importance of an Evidence Based approach, the so-called Reinforce School, and a smaller group of more critical scholars who are researching the actual practices of the Evidence Based movement in action (French 2018). French divides this last group into three schools: the Reformers, the Reinventers and the Rejectors. The Reform school states that with a series of adjustments here and there, such as the strengthening of interaction between researchers and users, the potential of Evidence Based Practice can be realized. The Reinvent school is more critical and states that major changes are needed in both the evaluation of the research that should be used and the application of research by policy makers. These changes require an explicit and empathetic commitment to managing evidence in policy processes and a much more comprehensive assessment of research products. The so-called Reject school is the most critical, and states that the idea of Evidence Based Practice does not have the potential to make a significant positive contribution to improving action in the health sector.

The insights that I present in this thesis lead to a different understanding of this debate. These insights help to show that, in the debate between these four schools, each school presents a selective caricature of the phenomenon Evidence Based practice, and chooses examples that suit their selective caricature.

The Reinforce school substantiates its approach with appealing success stories in which significant health benefits are achieved through the use of research results. A well-known example, which is prominently visible in the logo of the Cochrane Collaboration, is the research into the use of antenatal corticosteroids to speed up fetal lung development in women with an increased risk of preterm birth (Chalmers, Dickersin, and Chalmers 1992). After the results of various effect studies were brought together, it became clear that the use of antenatal corticosteroids could significantly reduce the risk of premature babies' death in a relatively simple way (Crowley, Chalmers, and Keirse 1990). In many Western countries, these results were applied relatively quickly, and on a large scale, saving the lives of thousands of babies.

The process perspective helps to show that, while this example offers a compelling argument for aggregating results and promoting the use of evidence, the linear success story in which the systematic review about antenatal corticosteroids is the point source of improvement, is too simplistic. The process perspective emphasizes that, when evaluating a KtA example, one should always take into account the characteristics of the specific case, the circumstances in which KtA processes took place, and the diverse range of actors and factors that played a role in these processes. In the case of antenatal corticosteroids, the knowledge was about a relatively well-defined and decontextualizable intervention, which worked through a physical mechanism and had a fairly direct effect. In this example, there was sufficient consensus about what mattered (saving lives babies) and about how this could be measured. The 'intervention' could be applied rapidly in countries with pre-existing institutions and infrastructures for appraising, disseminating and applying results, and well-developed health systems that made it relatively easy to reproduce the effective intervention elsewhere.

While the Reinforce school promotes reductionist/linear success stories, proponents of the Reform, Reinvent and the Reject school, in turn, present their own caricatures. In these caricatures, KtA processes do not get off the ground, because of the complexity of the issues that are addressed, or because the required conditions and infrastructures for knowledge production and application are missing, and those involved are unable to realize them (Braun and Kropp 2010; Epstein 20; French 2018). In these examples, researchers and users do not agree on what is of concern, how it can be measured and who should determine that, or results turn out to be inconsistent or unusable because the circumstances in which they are valid and/or usable cannot be reproduced (Douglas 2009; Gieryn 1999; Latour 1993b). Although the Reinventors and Rejectors rightly claim that KtA processes are more complex than the rhetoric of the Evidence Based movement, these critical schools ignore the productivity and efficiency of the Evidence Based approach, and the extent to which the practices of the movement have contributed to improving health.

Beyond the battle between the schools

The process perspective can be used to move past the artificial debate based on selective caricatures and help to formulate a more productive approach to organizing research, knowledge and learning practices for health. The process perspective can be used to pursue the ideal of the Evidence Based movement and build on its strengths, but also shows that one must be careful with too simplistic applications of a linear Evidence Based approach.

The process perspective shows that a linear Evidence Based approach can provide an efficient strategy for producing robust and useful knowledge, while clarifying that this approach works best for a specific type of issues and under very specific circumstances, such as reproducible interventions that have a relatively direct effect through biological or physical mechanisms, sufficient trust between researchers and users and relative consensus on what matters, how that should be investigated and who may determine what is of concern. The process perspective also shows that the linear Evidence Based approach is always dependent on a larger system of practices, institutions and networks and can only work if there are skilled users who combine knowledge elements from different sources and use them for specific aims in specific situations.

The process perspective further clarifies that an assertive linear Evidence Based approach, which assumes that its knowledge products are inherently superior, is risky. In the introduction, I illustrated this risk with the example in Peru, in which a strict the application of an Evidence Based guideline increased problems with multi-drug-resistant tuberculosis (Furin et al. 2001; Shin et al. 2004). I also laid out that knowledge is always under-determined and that the quality of knowledge is always dependent on, and must be realized in, specific local situations that are never fully known and controllable. There is thus never complete certainty that knowledge is valid and applicable in new situations, and changing circumstances and new insights and findings can undermine accepted knowledge. To prevent problems and disappointments, a linear KtA approach must be combined with modesty, a practical focus on what happens in local situations and regular feedback from the situations in which knowledge is used to those who organize research and other knowledge practices. To utilize the strengths of the Evidence Based movement and prevent problems, the linear KtA approach, which forms the core of the practices of the Evidence Based movement, has to be transformed into a more modest, reflexive and ultimately responsive Evidence Informed approach, which balances joint learning with a focus on the actual contribution to action for health.

The broader implication of the analyses in this thesis is that even a more modest and responsive version of the linear Evidence Based approach is too limited and can only provide a small part of the knowledge needed to improve action for health. To achieve the best possible action for health in specific situations, different types of knowledge from different sources, various competences, diverse learning processes, and a more distributed, inclusive and heterogeneous form of quality control are needed. Many elements of such a richer system of knowledge, research and learning practices have emerged and can be further developed depending on aims, resources and circumstances.

Towards a reflexive or a responsive school?

The process perspective, the responsive approach and methods (Contribution Mapping and Responsive Guidance) that I present in this thesis do not fit with either the Reinforce, Reform, Reinvent or Reject school. To link up and further develop the perspective, approach and methods, and those who seek to further develop and apply them, it may help to present them as part of a new school.

What should that school be? Within STS, several scholars have emphasized the need for institutional reflexivity in science and scientific governance (Beck, Ulrich 1992; Functowicz and Ravetz 1993; Jasanoff 1994; Leach 2005; Maasen and Weingart 2005). There are indications that, at least in some institutional contexts in a few Western countries, a more reflexive approach has become incorporated in the governance of science (Braun and Kropp 2010). One could point to these developments and argue that a Reflexive school is upon us.

One could also argue that this reflexive stance remains a largely theoretical and elitist debate among some Western scholars, still focusing on high science and a few illustrative cases. While important, these reflexive approaches can largely be seen as an institutional response to the existing plurality of scientific and normative viewpoints and an attempt at a more sophisticated accommodation of uncertainty (Braun and Kropp 2010). These reflexive approaches mostly focus on acknowledgement of uncertainty, a more critical stance towards truth claims and a broader participation of citizens and lay people in generically oriented high science (Maasen and Weingart 2005; Rowe and Frewer 2000, 2005; Wynne 1993). There has been less attention for finding the balance between locally specific, and more generically oriented knowledge production, the extent to which specific KtA approaches work for specific aims and issues in specific circumstances, and for adjusting KtA practices based upon evaluation of the extent to which they contribute productively towards intended goals.

Given the practical limitations of the reflexive approaches, one could also argue for a Responsive school. A key idea for such a Responsive school is that when knowledge production is intended to contribute to action for health, a balance must be found between building on proven methods and approaches to produce, appraise, transfer and apply knowledge, and a more modest and responsive way of working, which assumes that the most productive KtA approach depends on the issue at hand and on what is desirable and possible in local situations. The use of existing methods and approaches must therefore be combined with an ongoing search for the most productive way to organize knowledge practices for health. This search requires regular evaluation of how KtA processes evolve in practice and their contribution towards intended goals. The feedback that results from this evaluation can be used to adapt organized research and learning practices, with the aim to increase their contribution to action for health. This search process can build on insights into knowledge practices, and should take into account the diverse and ever evolving circumstances in which knowledge can be useful in achieving better health.

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Summary

Science has contributed to dramatic improvements in health worldwide. The application of knowledge from research has prevented a tremendous amount of suffering and misery, and allowed billions of people to live longer, healthier lives. During the past decades, the global investment in research for health has grown to an estimated 300 billion USD per year. While the investment in research, and the expectations of its benefits continue to increase, there are constant signals of problems and disappointments with the relevance, acceptance and use of research. Researchers, and those who identify with their results, report that a lot of valuable knowledge and applications are hardly used, or only after a long time. In numerous publications, they point to the gap between today's scientific advances and their application: between what is known and what is actually being done. Some well-known examples are studies that show that up to half of the patients in the United States and Europe are not receiving care according to best scientific evidence, and a major study on child survival in low-income countries, which concludes that 60% of the 10.8 million deaths among children could be prevented by simple, effective and affordable interventions.

While a lot of research-based knowledge is insufficiently used, there are also signs that research is not well suited to the needs of patients, health professionals and other stakeholders, and that many problems and challenges that they are struggling with are rarely investigated. Researchers in the health sector are incentivized to focus on innovative, well-defined, short-term solutions and well-measurable indicators that fit into a grant proposal, can be tested in well-arranged trials and that can be published in leading journals. The focus on constantly new, separate interventions for downstream causes can lead to valuable insights, but may also gaslight impacted populations, by implying that old known solutions do not work, and diverting attention from more fundamental causes and structural determinants of health, such as poverty, social inequality and discrimination. While researchers focus on the next novelty, much less attention is paid to implementing, scaling up and further developing known solutions and interventions and the strengthening of health systems. An additional problem is that the public seems to be less and less inclined to accept the results of research. The perception that research is disconnected from immediate public health needs, and that researchers are primarily focused on their personal interests, publication records and profit, instead of their ethical, moral and social responsibilities, has further increased distrust.

In the health sector, there have been all kinds of attempts to address the problems and disappointments with the relevance, acceptance and use of research. Initially, attempts to promote the use of research focused on better communication of results to intended users. While important, these attempts to improve communication also proved insufficient. Effective communication requires sustainable interaction and trust, and a communicative infrastructure that allows people and relevant knowledge to travel and interact. A second generation of approaches to improve the contribution of **k**nowledge production to **a**ction (I refer to the process of knowledge production and its use in action as as 'KtA') focused on improving the interaction between researchers, users and other stakeholders. Various interaction initiatives tried to link the actors and communities that played a role in the production and application of knowledge, support those involved with gaining insight into each other's needs, perceptions and values and help them to coordinate their practices. Stakeholders, such as patients, doctors and policy makers were involved in setting research priorities, conducting research and interpreting and applying results. When these interaction approaches also proved to be too limited, a third generation of KtA approaches was developed that attempted to take into account the entire system of actors, infrastructures and institutions involved in the production, transfer, synthesis and use of research.

While these new KtA approaches contain all sorts of valuable elements, they have also led to new questions and KtA challenges. Moreover, the problems and disappointments with the relevance, acceptance and the use of research hardly seem to diminish. A possible explanation for the persistence of these problems and the limited success of new generations of KtA approaches is that the promises about the benefits of research, the analysis of the problems with KtA and new KtA approaches implicitly or explicitly build on a too simplistic perspective on how the production and use of knowledge can contribute to better action for health

In this thesis, I try to present a richer, empirically ground and more useful perspective on KtA, which I refer to as the 'pragmatist process perspective'. To develop this perspective, I drew upon insights from diverse fields such as science and technology studies, cognitive psychology, management and innovation studies, public administration, and epistemology. These diverse fields offer a rich mosaic of insights into KtA, in which a phenomenological theory of KtA is embedded. In chapter two, I present this perspective on how knowledge is produced, transferred and used to contribute to better action for health.

This perspective, which is rooted in pragmatism and constructivism, offers an alternative to the incomplete KtA myths that implicitly or explicitly underpin many existing KtA approaches. The process perspective shows how, based upon a limited number of local experiences and observations, and experiments of a limited scope, knowledge can be constructed that has some validity at other times and places. In this perspective, knowledge is not a fixed and external product, but a dynamic part of a continuous process of knowledge acquisition and use, and ongoing work that is required to make knowledge generalizable and applicable at other times and places. These processes are always linked to a practice and embedded within a community. The process perspective emphasizes that, while knowledge always aims at a certain generality, action for health is concrete and locally specific. To use knowledge, it has be translated back from the generic to the locally specific. Knowledge thus has to be made locally applicable. Users combine knowledge elements from different sources, and articulate what this knowledge means for their own aims in their own situation.

While these insights have been available for years, they have not been integrated into an explicit perspective and it remains unclear to what extent such a perspective can help to better understand and address the persistent problems and disappointments with KtA in the health sector and help to better harness the transformative power of knowledge for health.

The aim in this thesis is to explore how insights into producing, appraising, transferring and using knowledge, can be used to improve the contribution of knowledge practices to action for health. In diverse empirical case studies in the Netherlands, Guinea Bissau and Ghana, I explore how the process perspective can help to better analyze problems with KtA, and develop new and more productive approaches.

Improving health promotion through an Evidence Based approach

The first two case studies, which I present in chapter four and five, focus on an attempt to improve the functioning of health promotion in the Netherlands, by applying an Evidence Based approach to health promotion ‘interventions’. In 2005, the Dutch Health Care Inspectorate (IGZ) published a report in which it stated that the quality of health promotion in the Netherlands was below expectations. In the report, the inspectorate described that it was unclear what the effect was of the wide variety of health promotion interventions that were implemented by organizations such as the

Municipality Health Services (GGD). To improve the performance of health promotion, the Ministry of Health asked the National Institute for Public Health and the Environment (RIVM) to set up the Center for Healthy Living (CGL). A core task of the CGL was to set up a system for assessing the effectiveness of health promotion interventions, the so called, Effectiveness Rating System (ERS).

To support the functioning of the ERS and the use of research into health promotion, the RIVM wanted to better understand what it could do to enhance the use of research evidence in the field of health promotion.

Chapter 4: Practitioner opinions on health promotion interventions that work: opening the black box of a linear Evidence Based approach

The first study, which was formulated to inform the development of the rating system, focused on mapping the demand for, and actual use of, health promotion interventions. While attempts are being made to improve health promotion by following a linear Evidence-Based approach, the actors involved are aware that the quality of health promotion is not just a matter of supplying 'evidence-based' interventions to local practitioners, but the result of a situated coproduction process that depends on many factors.

While the CGL focused on assessing ‘interventions’, it was unclear what these ‘interventions’ consisted of, and how they could be moved from one time or place to the other. We therefore explored what constituted an ‘intervention that works’ from the perspective of health promotion practitioners and how, according to them, the development and implementation of interventions should be improved.

For this study, we interviewed 81 health promotion practitioners about the use of 10 health promotion interventions at 30 Municipality Health Services in The Netherlands. The practitioners described an intervention that works as something that produces its intended effects after being realized in a local situation. Interventions are realized by combining elements of a supplied intervention (e.g. theory, plan, artefacts) with elements that are situated in the local context (e.g. funding, local network, political support). Interventions that are transferred contain implicit assumptions about local contexts, but it is often unclear what precisely constitutes an intervention and what is assumed of local contexts. An intervention that works can be seen as a situated configuration of aligned elements. A linear Evidence Based approach depends on the realization of the local circumstances in which 'evidence based' interventions can work. Various strategies are possible for approximating such circumstances, but the core assumption that the configuration that is realized in practice is similar to the 'evidence based' intervention seems unrealistic for most health promotion in the Netherlands. Under such circumstances, attention should shift from central quality assurance to the system of actors and the distributed actions and heterogeneous learning processes that together add up to interventions that work.

Chapter 5: Improving health promotion: from hopeful ratings to Responsive Guidance

In chapter five, I analyze the way in which the quality of interventions is assessed and rated, and the contribution of the, so called, Effectiveness Rating System to improvement in practice. In various countries, attempts are made to improve health promotion through an evidence-based approach. Available evidence is used to centrally rate the quality of interventions, after which practitioners are encouraged to use these ratings. The Evidence Rating System (ERS) is an improvement-oriented approach in which expert committees assess submitted interventions and rate them as ‘theoretically sound’, ‘probably effective’ or ‘proven effective’. The aim of this study was to explore the functioning of the ERS and the perspective of researchers, policymakers and practitioners regarding its contribution to improvement

For this analysis, we interviewed 53 selected key-informants from research, policy and practice in the Netherlands and observed the assessment of 12 interventions. Interviews revealed the assumption that the ERS contributes to two improvement dynamics: 1) the improvement of available interventions and 2) the improvement of health promotion in practice. While the describing and rating of interventions promotes learning and enhances the transferability of the interventions, the ERS seems too limited to effectively steer and stimulate these two improvement dynamics. Of the 94 submitted interventions, only three were recognized as ‘proven effective’, one of which is considered impracticable by practitioners. While the expert committees struggle with a lack of norms for relevant effects and questions about how effects are best studied and rated, the ERS fails to encourage the improvement of aspects – like applicability and costs – deemed important by policymakers and practitioners. It neglects the local adaptation of interventions, and stakeholders worry that the lack of proven effectiveness will legitimize cutbacks rather than advance health promotion. At the end of chapter five, we present a sketch of a richer approach, named Responsive Guidance, which is designed to more effectively steer learning about interventions and improvement of the functioning of interventions in practice.

Chapter 6: The emergence and current performance of a Health Research System: lessons from Guinea Bissau

In chapter six, I zoom out and move to a very different context. Instead of focusing on interventions in health promotion in the Netherlands, I analyze the emergence and functioning of the health research system in Guinea Bissau, one of the poorest and least developed countries in the world. In 2008, I presented an analysis of research use in West Africa at the Ministerial Summit on Research for Health in Bamako, Mali. After my presentation, I was approached by a representative of the Council for Health Research for Development (and the Deputy Minister of Health of Guinea Bissau. They were interested in an independent analysis of the functioning of the research system in Guinea Bissau and an assessment of the impact of the local research. This analysis was meant as input for the design of a strategy for strengthening the national health research system. This strategy had three components: 1) developing a national research policy, 2) setting a national research agenda, and 3) setting up the new National Institute of Public Health (INASA).

Little is known about how health research systems (HRS) emerge and evolve over time, and how this process relates to their performance. Understanding how HRSs emerge is important for the development of well-functioning National Health Research Systems (NHRS). In Guinea Bissau, we studied how the HRS has emerged and evolved over time and how the present system functioned. We used a qualitative case-study methodology to explore the emergence and current performance of the HRS, using a NHRS framework. We reviewed documents and carried out 39 in-depth interviews, ranging from health research to policy and practice stakeholders. The analysis showed how the development of the research system, the research that is being conducted, and its use, is shaped by a combination of local health issues, social, political and economic circumstances, the priorities of foreign donors and expatriate researchers, the local research capacities and the nature of the research findings. The research practices in Guinea Bissau led to the emergence of a HRS with both local and international links and strong dependencies on international partners and donors. The post-colonial, volatile and resource-dependent context, changes in donor policies, training of local researchers and nature of the research findings influenced how the HRS evolved. Research priorities have mostly been set by ‘expatriate’ researchers and focused on understanding and reducing child mortality. Research funding is almost exclusively provided by foreign donors and international agencies. The training of Guinean researchers started in the mid-nineties and has since reinforced the links with the health system, broadened the research agenda and enhanced local use of research. While some studies had a large international impact, the use of research findings within Guinea Bissau has been constrained by the weak and donor dependent health system, volatile government, top-down policies of international agencies, and the controversial nature of research findings. The analysis shows that if the aim of research is to contribute to action through local decision making, it is essential to set national research priorities, align funding to local needs, build research capacity and link research to decision making processes. Donors and international agencies can contribute to this process by coordinating their efforts and aligning to national priorities. The analysis also showed that the NHRS approach is too limited, because it does not take into account how research knowledge is translated into action and neglects the local work, actors and circumstances that are involved in the use of research.

Chapter 7: Examining the societal impact of research

In chapter seven, I zoom in on the use of research. I show how, based upon a series of case studies, I have formulated a description of what the societal impact of research is and provide an empirically grounded characterization of the nature of this process.

To more effectively employ research for health, it is essential to evaluate its impact. The aim of the study presented in this chapter was to construct an empirically based operationalization of the societal impact of research that is useful for research monitoring and evaluation. An iterative, case study based approach was followed in which 22 purposively selected key informants were interviewed to map how six research and translation processes in Ghana and Guinea Bissau evolved. The empirical analyses showed that the societal impact of research depends on the agency of multiple actors and the evolving circumstances in which they are embedded, and cannot be attributed to a research project as point-source. Instead of trying to measure and attribute the 'impacts' of research, it is more realistic to map the 'contributions to action' that are realized. The contribution of research to action for health must be seen as a precarious and ongoing process in which knowledge plays a meaningful role in action for health. To realize a contribution to action, actors put forward a –more or less explicit– future story in which knowledge plays a role and then try to realize that, so called, actor-scenario. For analytical purposes, a useful distinction can be made between 1) contributions through the research activities, 2) contributions to knowledge and research, 3) contributions to action through linked-utilization and 4) contributions to action through utilization at-a-distance. Specific criteria were developed for 'what counts as' a contribution to action. After applying these criteria, a contribution to action was identified in five of the six assessed research projects. The empirical explorations illustrate that the developed operationalization, contribution categories and criteria are useful for evaluating research use and for learning how to better employ research for health.

Chapter 8: Contribution Mapping: a method for mapping the contribution of research to enhance its impact

In chapter eight, I present Contribution Mapping, a method which I developed, together with others, to assess the use of research, with the aim of enhancing its impact. At a time of growing emphasis on both the use of research and accountability, it is important for research funders, researchers and other stakeholders to monitor and evaluate the extent to which research contributes to better action for health, and find ways to enhance the likelihood that beneficial contributions are realized. Past attempts to assess research 'impact' struggle with operationalizing 'impact', identifying the users of research and attributing impact to research projects as source. In this chapter we describe *Contribution Mapping,* a novel approach to research monitoring and evaluation that aims to assess contributions instead of impacts. The approach focuses on processes and actors and systematically assesses anticipatory efforts that aim to enhance contributions, so-called *alignment efforts*. The approach is designed to be useful for both accountability purposes and for assisting in better employing research to contribute to action for health.

Contribution Mapping is inspired by a perspective from social studies of science on how research and knowledge utilization processes evolve. For each research project that is assessed, a three-phase process map is developed that includes the main actors, activities and *alignment efforts* during research formulation, production and knowledge extension (e.g. dissemination and utilization). The approach focuses on the actors involved in, or interacting with, a research project (the *linked actors*) and the most likely influential users, who are referred to as potential *key users*. In the first stage, the investigators of the assessed project are interviewed to develop a preliminary version of the process map and first estimation of research-related contributions. In the second stage, potential *key-users* and other informants are interviewed to trace, explore and triangulate possible contributions. In the third stage, the presence and role of *alignment efforts* is analyzed and the preliminary results are shared with relevant stakeholders for feedback and validation. After inconsistencies are clarified or described, the results are shared with stakeholders for learning, improvement and accountability purposes. *Contribution Mapping* provides an interesting alternative to existing methods that aim to assess research impact. The method is expected to be useful for research monitoring, single cases studies, comparing multiple cases and indicating how research can better be employed to contribute to better action for health.

Chapter 9: Which research gets used and why? an empirical analysis of 30 cases in Ghana

The final two empirical chapters focus on a new strategy for organizing health research, which was implemented in Ghana. In the early nineties, analyses showed that conventional health research contributed little to health and development in low-income countries, because it was dominated by foreign scholars and was oriented towards international, rather than local research needs. After a long and difficult preparatory process, this led to a Ghanaian-Dutch research program. The program tried to increase the likelihood that research contributed to action by funding studies that were oriented towards national priorities and that were led by locally embedded researchers. After five years of prioritizing, selecting and funding research, the designers of the program asked for an independent analysis of the impact of the funded studies, and the way this impact was related to the strategy of the research program.

While health research is considered essential for improving health worldwide, it remains unclear how research is best organized to contribute to health, especially in lower-income countries. The aim of this study was to map the contribution of this research to action and examine which features of research and translation processes were associated with the use of the results. Using contribution mapping, we systematically examined how 30 studies evolved and how results were used to contribute to action. We combined interviews with 113 purposively selected key informants, document analysis and triangulation to map how research and translation processes evolved and contributions to action were realized. After each case was analysed separately, a cross-case analysis was conducted to identify patterns in the association between features of research processes and the use of research.

The results of 20 of the 30 studies were used to contribute to action within 12 months. The priority setting and proposal selection process led to the funding of studies which were from the outset closely aligned with health sector priorities. Research was most likely to be used when it was initiated and conducted by people who were in a position to use their results in their own work. The results of 17 out of 18 of these user initiated studies were translated into action. Other features of research that appeared to contribute to its use were involving potential key users in formulating proposals and developing recommendations.

Our study underlines the importance of supporting research that meets locally-expressed needs, and that is led by people embedded in the contexts in which results can be used. Supporting the involvement of health sector professionals in the design, conduct and interpretation of research appears to be an especially worthwhile investment. The case studies also helped to further develop the perspective on how the process of translating results into action evolves, and is shaped by larger structures and dynamics in the context.

Chapter 10: Towards effective North-South collaboration: realizing a program for demand-driven and locally led research

In the final empirical chapter, I focus on the emergence and functioning of the program for demand-driven research which was located in Ghana, and supported by a North-South collaboration. I show through which efforts this program was developed and implemented, how those involved tried to orient research to national priorities in Ghana and facilitate locally embedded research, which remained dependent on a sponsorship constellation in the Netherlands.

At the turn of the nineties, studies showed that health research contributed little to health and development in low and middle-income countries because it was oriented towards international priorities and dominated by researchers from the North. A new approach to North-South collaboration was required, that would support demand-driven and locally led research in the South. The aim of the study presented in this chapter was to analyse the development and functioning of a program for demand-driven and locally led research in Ghana that was supported by a North-South collaboration. For this mixed-method case-study, we combined document analysis, key-informant interviews and observation of program events. The development of the research program started with constructing a sponsorship constellation in the Netherlands. After showing the problems with traditional research collaboration, an advisory council formulated a vision for a more equal and effective approach to North-South collaboration. Together with Ghanaian partners, this vision was turned into a proposal for a Ghanaian-led program for demand-driven and locally led research, which was funded by the Netherlands government. Research priority setting showed that the Ghanaian research needs were very different from the priorities of foreign funders and researchers. After a slow start, the number of locally submitted proposals increased from 13 in 2001 up to 94 in 2005, revealing a substantial, but partly latent reservoir of research capacity. In total, 79 studies were funded. An impact evaluation showed that results were often used to contribute to action. Despite its success, the research program came to an end in 2008 after the sponsorship constellation in the

Netherlands fell apart and attempts to mobilize funding in Ghana did not succeed. Our study shows that realizing a program for demand-driven and locally led research in the South provides an effective approach to North-South collaboration in which results are used and local capacities and institutions are strengthened.

Chapter 11: General discussion: the added value of the pragmatist process perspective

In the final chapter, I return to the overall aim in this thesis, which was to explore how insights into producing, appraising, transferring and using knowledge, can be used to improve the contribution of knowledge practices to action for health.

I start the final chapter with discussing the extent to which the KtA myths were present in the KtA approaches that I have analysed in the Netherlands, Guinea Bissau and Ghana. I then discuss some explanations for the persistence of these KtA myths and their implications for the use of the process perspective. In the second part, I explore the added value of the process perspective. I discuss how the insights into the nature and dynamics of KtA processes shed new light on four much-discussed problems with KtA: 1) disappointments and problems with the use of research, 2) combining knowledge from research with knowledge from other sources, 3) the trade-off between the substantiation and the applicability of knowledge; and 4) the limitations of central quality assurance.

I continue with discussing key insights and lessons that arise from the empirical chapters and their implications for both understanding KtA processes and for attempts to improve their functioning and productiveness. I first touch upon the explicit characterization of the translation of knowledge into action, and its implications for understanding and improving the use of knowledge. Next, I discuss the search for a balance between locally specific and more generically oriented knowledge production. I continue with discussing the various actors and communities that play a role in KtA and the way in which KtA processes are influenced by larger structures and dynamics in the context. I then discuss the importance of a reflexive and responsive approach, in which organized KtA processes are monitored and adapted with the aim to improve their productivity. Finally, I explore some possible implications of the insights in this thesis for the further development of the Evidence Based movement, and argue for a Responsive School for the organization of knowledge practices and learning processes for health.

Samenvatting

De wetenschap heeft wereldwijd op indrukwekkende wijze bijgedragen aan het verbeteren van de volksgezondheid. Door het toepassen van de resultaten van onderzoek is enorm veel lijden en ellende voorkomen en leven miljarden mensen langer en gezonder. De afgelopen decennia zijn wereldwijd de investeringen in gezondheidsgerelateerd onderzoek snel gegroeid, tot naar schatting ruim 300 miljard dollar per jaar. Terwijl de investeringen in onderzoek, en de verwachtingen van de baten van onderzoek blijven toenemen, verschijnen er tegelijkertijd steeds weer meldingen over problemen met de relevantie, acceptatie en het gebruik van onderzoek. Talrijke analyses laten zien dat veel waardevolle kennis en innovaties niet, nauwelijks of op heel beperkte schaal worden toegepast. Tegelijkertijd zijn er ook aanwijzingen dat onderzoek vaak niet goed aansluit bij de dagelijkse praktijk van patiënten, gezondheidswerkers en andere belanghebbenden, en dat veel problemen en uitdagingen waar ze mee worstelen nauwelijks worden onderzocht. Er bestaat duidelijk een forse kloof tussen de wetenschappelijke vooruitgang en de toepassing van onderzoeksresultaten; tussen wat bekend is, en wat er in de dagelijkse praktijk gebeurt.

In dit proefschrift richt ik mij op wat er gedaan kan worden om bijdrage van onderzoek aan het verbeteren van de zorg en de volksgezondheid, te vergroten. Hoe moeten we onderzoek organiseren als het doel is om niet alleen te publiceren, maar juist ook om bij te dragen aan betere behandelingen, effectiever gezondheidsbeleid, maatschappelijke vooruitgang en een gezondere populatie? Wat voor onderzoek is er eigenlijk nodig? Hoe laten we onderzoek beter aansluiten bij de behoeften van patiënten, zorgverleners en beleidsmakers? Hoe organiseren we onderzoek op een manier die de kans op toepassing van de resultaten vergroot? Hoe zorgen we ervoor dat waardevolle kennis wordt gebruikt? Niet alleen hier en nu, of slechts bij enkele patiënten, maar ook later en elders, en op grote schaal, zodat zoveel mogelijk mensen baat hebben bij de resultaten van onderzoek?

In deze vragen gaat het steeds over hoe robuuste kennis tot stand komt en wordt overgedragen, en over hoe die kennis later of elders wordt toegepast. Maar, wat is eigenlijk kennis? Wat is een bruikbaar perspectief op het gebruik van kennis? En hoe zit het met de kwaliteit van kennis? In hoeverre kunnen we de kwaliteit van kennis bepalen en borgen? Hoe kunnen we die kwaliteitsborging zo organiseren, dat wetenschappelijke adviezen ook bruikbaar zijn en bijdragen aan

daadwerkelijke verbetering? Als het doel is om met onderzoek bij te dragen aan maatschappelijke vooruitgang, hoe kunnen we dan die ‘impact’ van onderzoek in kaart brengen?
In ontwikkelingslanden is het nog crucialer om onderzoek te richten op de juiste prioriteiten, resultaten zorgvuldig te wegen en deze zo goed mogelijk te benutten. Deze landen kampen veelal met grote gezondheidsproblemen en een zwak zorgsysteem, en weinig geld en ander middelen voor onderzoek. Hoe kunnen deze landen het beste worden ondersteund met het ontwikkelen van goed functionerende onderszoekssystemen, die bijdragen aan een betere zorg en een gezondere populatie? In het verleden is gebleken dat internationale onderzoekssamenwerking de ontwikkeling van lokale onderzoekssystemen kan beperken, doordat onderzoek veelal gericht is op de prioriteiten van buitenlandse onderzoekers en financiers en de nationale elite, in plaats van lokale agenda’s en de behoeften van meer gemarginaliseerden groepen. Hoe kunnen we in ontwikkelingslanden vraaggericht, lokaal specifiek en lokaal geleid onderzoek ondersteunen, op een manier die bijdraagt aan lokale ontwikkeling? Als vraaggericht en lokaal specifiek onderzoek zo essentieel is, hoe zit dat dan in Nederland? Hoe vinden we in Nederland dan beste balans tussen generiek georiënteerd onderzoek, waar zoveel mogelijk mensen baat bij hebben, en lokaal specifiek onderzoek dat duidelijk ook essentieel is?

In deze thesis ga ik op zoek naar een antwoord op deze vragen. In verschillende landen bestudeer ik problemen met onderzoek, en concrete pogingen om onderzoek, en bijbehorende kennispraktijken, beter te organiseren, met als doel om de bijdrage aan een betere zorg en gezondheid te vergroten. Ik richt mij nadrukkelijk niet op één proces, maar juist op de hele keten van praktijken en processen waarmee kennis wordt geproduceerd, overdragen, beoordeeld en toegepast. Ik gebruik de afkorting KtA (Knowledge to Action) om te verwijzen naar deze keten van processen en praktijken.

De afgelopen decennia zijn in de gezondheidssector allerlei pogingen gedaan om de problemen en teleurstellingen met de bijdrage van onderzoek aan actie voor gezondheid aan te pakken. In eerste instantie waren deze inspanningen vooral gericht op het verbeteren van de communicatie van onderzoeksresultaten naar beoogde gebruikers. Hoewel belangrijk, bleek het verbeteren van deze communicatie ook onvoldoende. Een tweede generatie van KtA-benaderingen was gericht op het verbeteren van de interactie tussen onderzoekers, gebruikers en andere belanghebbenden. Door duurzame interactie konden de verschillende actoren en gemeenschappen die een rol speelden bij de productie en toepassing van kennis inzicht krijgen in elkaars behoeften, percepties en waarden en hun praktijken op elkaar afstemmen. Als onderdeel van deze interactiebenaderingen werden allerlei belanghebbenden, zoals patiënten, verpleegkundigen en beleidsmakers, betrokken bij het stellen van onderzoeksprioriteiten, het uitvoeren van onderzoek en het interpreteren en toepassen van resultaten. Toen deze interactiebenaderingen ook te beperkt bleken, werd een derde generatie KtA-benaderingen ontwikkeld die probeerde rekening te houden met het hele systeem van actoren, instituties en infrastructuren dat betrokken is bij de productie, overdracht en het gebruik van onderzoek.

Hoewel deze nieuwe KtA-benaderingen allerlei waardevolle elementen bevatten, lijken de problemen met de relevantie, acceptatie en het gebruik van onderzoek nauwelijks af te nemen. Een mogelijke verklaring voor het aanhouden van deze problemen en het beperkte succes van nieuwe generaties KtA-benaderingen is dat de beloften over de baten van onderzoek, de analyse van de problemen met KtA en de nieuwe KtA-benaderingen impliciet of expliciet voortbouwen op een te simplistisch perspectief op hoe de productie en het gebruik van kennis kunnen bijdragen aan een betere zorg en gezondheid. In dit proefschrift analyseer ik in hoeverre een rijker begrip van kennispraktijken kan helpen om problemen met onderzoek beter te begrijpen.

In het tweede hoofdstuk schets ik een empirisch gegrond perspectief op hoe kennis tot stand komt, wordt overgedragen en later of elders wordt toegepast. Dit zogenaamde pragmatische procesperspectief biedt een alternatief voor het onvolledige en vaak reductionistische KtA perspectief dat impliciet of expliciet ten grondslag ligt aan veel bestaande KtA-benaderingen.

Dit procesperspectief verheldert hoe, op basis van een beperkt aantal lokale ervaringen en observaties, en experimenten met een beperkte omvang, kennis kan worden geconstrueerd die op andere plaatsen en tijden enige geldigheid heeft. In dit perspectief is kennis geen vaststaand en extern product, maar een dynamisch onderdeel van een continu proces van kennisverwerving en -gebruik, en is er steeds weer werk nodig om kennis generaliseerbaar en toepasbaar te maken op andere plaatsen en tijden. Deze processen zijn altijd gekoppeld aan een praktijk en ingebed in een gemeenschap. Het procesperspectief benadrukt dat, hoewel kennis altijd gericht is op een bepaalde algemeenheid, actie voor gezondheid waarin kennis wordt toegepast, juist concreet en lokaal specifiek is. Om kennis te gebruiken, moet deze getransleerd worden van het generieke naar het lokaal specifieke. Gebruikers maken kennis lokaal toepasbaar. Ze combineren kenniselementen uit onderzoek, met kennis uit andere bronnen, zoals scholing en ervaring en articuleren wat deze kennis betekent voor hun eigen doelen in hun eigen situatie.

In de hoofdstukken vier tot en met negen presenteer ik een reeks empirische studies naar concrete problemen met KtA, en pogingen om KtA-processen beter te laten werken. Tevens presenteer ik een methode om de impact van onderzoek in kaart te brengen.

In Nederland bestudeerde ik een poging om via een Evidence Based benadering de kwaliteit van gezondheidsbevordering te verbeteren. Deze benadering werd ontwikkeld nadat de Inspectie voor de Gezondheidszorg in een rapport stelde dat er grote twijfels waren over de effectiviteit van de gezondheidsbevordering. Volgens de inspectie was niet duidelijk in hoeverre de vele gezondheidsbevorderende interventies die door GGD-en, de thuiszorg en andere organisaties, werden uitgevoerd, effect hadden. Tevens waren er aanwijzingen dat bestaand onderzoek naar gezondheidsbevordering nauwelijks werd benut. Om de effectiviteit van de gezondheidsbevordering te verbeteren werd bij het RIVM het zogenaamde Erkenningssysteem opgezet. Als onderdeel van deze benadering werd aan de ontwikkelaars van interventies gevraagd om de effectiviteit van interventies te onderzoeken en interventies zorgvuldig te beschrijven. Deze beschrijvingen werden vervolgens ingediend bij het Erkenningssysteem, waar commissies van experts interventies beoordeelden als zijnde 1) goed beschreven, 2) goed onderbouwd, 3) waarschijnlijk effectief, of 4) bewezen effectief. Het idee was dat de gezondheidsbevorderaars die door heel Nederland werkzaam zijn, vervolgens de best beoordeelde interventies zouden gaan gebruiken, wat zou leiden tot betere gezondheidsbevordering in de praktijk.

In hoofdstuk vier beschrijf ik de eerste empirische studie, waarin ik onderzocht wat het perspectief is van gezondheidsbevorderaars op interventies die werken. Samen met collega's van het RIVM bezocht ik alle GGD-en in Nederland en vroeg ik aan gezondheidsbevorderaars wat 'interventies die werken', eigenlijk zijn.We vroegen waar die interventies uit bestaan en hoe ze die in de praktijk realiseren en waar ze behoefte aan hadden. Ze beschreven een 'interventie die werkt' als een combinatie van elementen, die samen een beoogde effect teweegbrengen nadat een interventie in een lokale situatie is gerealiseerd. Interventies komen tot stand door elementen van een aangeleverde interventie (bv. een protocol en posters) te combineren met elementen die gesitueerd zijn in de lokale situatie (bv. financiering, lokaal netwerk, politieke steun). De analyse laat zien dat de interventies die worden ontwikkeld, bestudeerd, beoordeeld en overgedragen allerlei impliciete aannames bevatten over die lokale contexten. In de praktijk blijft het veelal onduidelijk waar een interventie precies uit bestaat, wat er van lokale contexten wordt verondersteld en of die veronderstellingen wel kloppen. De analyse laat tevens de beperking zien van een lineaire Evidence Based benadering. De gezondheidsbevorderaars vertelden dat de interventies die uiteindelijk in de praktijk worden gerealiseerd sterk verschillen van de 'evidence based' interventies die elders zijn onderzocht en die zijn beoordeeld door het Erkenningssysteem. Onder dergelijke omstandigheden lijkt een eenzijdige focus op overdraagbare interventies te beperkt. Naast de aandacht voor centrale kwaliteitsborging is een bredere benadering nodig, die rekening houdt met het hele systeem van actoren en acties en de heterogene leerprocessen die samen leiden tot interventies die in lokale situaties bijdragen aan betere gezondheid.

Voor de tweede studie onderzocht ik het functioneren van het Erkenningssysteem en het perspectief van onderzoekers, beleidsmakers en gezondheidsbevorderaars op de mate waarin deze benadering bijdraagt aan concrete verbetering. Uit interviews en observaties bleek dat, hoewel het beschrijven en beoordelen van interventies nuttig kan zijn, en het de overdraagbaarheid van de interventies vergroot, het Erkenningssysteem te beperkt is om sturing te bieden aan de verbetering van beschikbare interventies en de toepassing van interventies in de praktijk. Van de 94 ingediende interventies werden er slechts drie erkend als ‘bewezen effectief’. De expertcommissies worstelden met een gebrek aan normen voor relevante effecten en voerden veel discussie over hoe effecten het best bestudeerd en beoordeeld konden worden. Tegelijkertijd was er nauwelijks aandacht voor de kosten en toepasbaarheid van interventies, terwijl dat juist belangrijk werd gevonden door de gezondheidsbevorderaars die interventies toepassen, en de wethouders en beleidsmakers die gezondheidsbevordering financieren. De betrokkenen vertelden dat ze vreesden dat de eenzijdige focus op effectiviteit, en het negeren van de toepasbaarheid en kosten van interventies, vooral het beeld zou versterken dat gezondheidsbevordering niet werkte en zou leiden tot bezuinigingen in plaats van betere gezondheidsbevordering. Ik eindig dit hoofdstuk met een schets van een alternatieve benadering, genaamd *Responsive Guidance*, die gerichter sturing zou kunnen bieden aan het verbeteren van beschikbare interventies, en het verbeteren van de gezondheidsbevordering in de praktijk.

In Guinee-Bissau bestudeerde ik een poging om het nationale gezondheidsonderzoeksysteem te ontwikkelen. Ondanks dat Guinea-Bissau één van de armste en meest instabiele landen in Afrika is, wordt er al decennia lang hoogwaardig onderzoek gedaan in de gezondheidszorg, dat beschreven staat in honderden wetenschappelijke publicaties in gerenommeerde internationale tijdschriften. Het Ministerie van Volksgezondheid wilde graag dat onderzoek meer zou bijdragen aan de lokale zorg en gezondheid, en trachtte tevens om een nationaal onderzoeksinstituut voor de volksgezondheid op te zetten. Ze vroegen om een analyse van de ontwikkeling en het functioneren van het nationale onderzoekssysteem, welke moest dienen als input voor de nationale onderzoeksstrategie. De analyse laat zien hoe de ontwikkeling van het onderzoeksysteem, het onderzoek dat wordt uitgevoerd en het gebruik daarvan zijn gevormd door een combinatie van lokale gezondheidsproblemen, sociale, politieke en economische omstandigheden, de prioriteiten van buitenlandse donoren en onderzoekers, de zeer beperkte lokale onderzoekscapaciteiten en de aard van de onderzoeksresultaten. De onderzoekspraktijken in Guinee-Bissau hebben geleid tot het ontstaan van een rudimentair onderzoeksysteem met zowel lokale als internationale banden en een sterke afhankelijkheid van internationale partners en donoren. Hoewel sommige studies een grote internationale impact hebben gehad, werd het gebruik van onderzoeksresultaten in Guinee-Bissau beperkt door het zwakke en donorafhankelijke zorgsysteem, de instabiele overheid, het top-downbeleid van internationale organisaties en de controversiële aard van resultaten. De analyse laat zien dat als beoogd wordt om middels onderzoek bij te dragen aan lokale verbetering, getracht moet worden om onderzoek beter aan te laten sluiten bij nationale prioriteiten, financiering af te stemmen op lokale behoeften, onderzoekscapaciteit op te bouwen en onderzoek te koppelen aan lokale besluitvorming. Donoren en internationale organisaties kunnen aan dit proces bijdragen door hun steun beter te coördineren en af te stemmen op nationale prioriteiten. Door het koppelen van onderzoeksprogrammering aan lokale besluitvorming kan een positieve spiraal ontwikkeld worden, waarbij de nationale overheid onderzoek als bruikbaar ervaart, en daarom in onderzoek investeert.

Hoofdstuk zeven en acht gaan over wat het gebruik van onderzoek eigenlijk is, en hoe dat kan worden gemeten. In hoofdstuk zeven zet ik uiteen hoe ik op basis van een reeks empirische analyses heb getracht om een beschrijving te formuleren van wat de ’maatschappelijke impact van onderzoek’ is. Tevens bied ik een perspectief op hoe de maatschappelijke impact van onderzoek tot stand komt. De empirische analyses die ik presenteer laten zien dat de ‘impact’ van onderzoek tot stand komt door de acties en interacties van allerlei actoren en de evoluerende omstandigheden waarin deze zijn ingebed, en dus niet simpelweg kan worden toegeschreven aan de kracht of richting van een onderzoeksproject. In plaats van te proberen de 'impact' van onderzoek te meten, beargumenteer ik dat het realistischer is om de 'bijdragen aan actie' in kaart te brengen. De bijdrage van onderzoek aan actie voor gezondheid kan worden gezien als een precair en continu proces waarin kennis een betekenisvolle rol speelt in actie voor gezondheid. Om een ‘bijdrage aan actie’ te realiseren, zetten actoren een soort scenario uiteen, over een toekomstige wereld waarin onderzoeksresultaten een rol krijgen toebedeeld. Anderen kunnen reageren op zo een scenario, en zelf ook verhalen naar voren brengen waarin onderzoeksresultaten een soortgelijke of heel andere rol speelt. De uiteindelijke ‘bijdrage aan actie’ die wordt gerealiseerd is veelal het resultaat van de interactie van verschillende scenario’s en pogingen om deze te realiseren. Ik beargumenteer dat het voor analytische doeleinden zinvol kan zijn om een onderscheid te maken tussen vier verschillende soorten ‘impacts’, 1) bijdragen via onderzoeksactiviteiten, 2) bijdragen aan kennisontwikkeling en onderzoek, 3) bijdragen aan actie via gekoppelde toepassing en 4) bijdragen aan actie door gebruik op afstand.

In hoofdstuk acht presenteer ik Contribution Mapping, een nieuwe methode die ik samen met anderen heb ontwikkeld om het gebruik van onderzoek mee in kaart te brengen. Om onderzoek effectiever te organiseren kan het helpen om het gebruik van onderzoek te monitoren en te evalueren. Bestaande methoden om de ‘impact’ van onderzoek te meten, worstelen veelal met het operationaliseren van ‘impact’, het identificeren van de gebruikers van onderzoek en het attribueren van ‘impact’ aan onderzoeksprojecten als bron.

Contribution Mapping is geënt op een expliciet perspectief op hoe onderzoeksprocessen verlopen en resultaten wordt getransleerd in actie. Om de ‘impact’ van een onderzoeksproject te analyseren wordt een proceskaart gemaakt, met daarop voor elke fase van het onderzoek de belangrijkste actoren, interacties en activiteiten. De methode is vooral gericht op de actoren die betrokken zijn bij, of interacteren met een onderzoeksproject (de gekoppelde actoren) en de meest waarschijnlijke en invloedrijke gebruikers (potentiële key-users). Eerst worden de betrokken onderzoekers en geïnterviewd om een voorlopige versie van de proceskaart en een eerste schatting van mogelijke routes en ‘impacts’ te ontwikkelen. In de tweede fase worden potentiële key-users en andere informanten geïnterviewd om mogelijke toepassingen op te sporen, te analyseren en te trianguleren. In de derde fase wordt de rol van afstemmingsinspanningen geanalyseerd en worden de voorlopige resultaten gedeeld met belanghebbenden voor feedback en validatie. Nadat inconsistenties zijn opgehelderd of beschreven worden de resultaten gedeeld. Contribution Mapping is naar verwachting bruikbaar voor het monitoren en evalueren van onderzoeksprogramma’s, voor individuele casestudies, het vergelijken van onderzoeksprojecten en om te analyseren wat gedaan kan worden om de bijdrage van onderzoek aan zorg en gezondheid te verbeteren.

In de laatste twee empirische hoofdstukken analyseer ik het functioneren, de effectiviteit en de duurzaamheid van een nieuwe strategie voor internationale onderzoekssamenwerking. Deze strategie was ontwikkeld nadat was gebleken dat gezondheidsonderzoek in ontwikkelingslanden vaak weinig bijdroeg aan het verbeteren van de lokale zorg en gezondheid, omdat veel onderzoek gericht was op de prioriteiten van internationale onderzoekers en financiers en niet goed aansloot bij lokale vragen en behoeften. Een bijkomend probleem was dat in veel ontwikkelingslanden vooral de elite invloed had op onderzoek en van de resultaten profiteerden, in plaats van meer gemarginaliseerde groepen, waardoor onderzoek ongelijkheid kon vergroten. In reactie op deze problemen ontwierpen Nederlandse en Ghanese experts een nieuwe onderzoeksstrategie, waarbij in Ghana via een jaarlijkse onderzoekscyclus tientallen vraaggerichte en lokaal geleidde studies werden gefinancierd, welke ondersteund werden door een Noord-Zuid samenwerking. Om de kans te vergroten dat onderzoek bijdroeg aan verbetering werden studies gefinancierd die gericht waren op nationale prioriteiten en die werden geleid door lokaal ingebedde onderzoekers.

Ik bestudeerde in hoeverre het onderzoek dat voort kwam uit dit onderzoeksprogramma bijdroeg aan concrete verbetering, en hoe deze ‘impact’ samenhing met de manier waarop het onderzoek was georganiseerd. Gedurende meerdere jaren volgde ik 30 onderzoeksprojecten en bracht ik in kaart hoe deze studies tot stand kwamen en werden uitgevoerd, wie daarbij betrokken waren en met welke potentiele gebruikers ze interacteerden, wat er gedaan werd om resultaten toe te passen en hoe deze pogingen verliepen. De analyse laat zien dat de resultaten van 20 van de 30 onderzoeksprojecten binnen 12 maanden werden toegepast. Het afstemmen van onderzoek op nationale prioriteiten en de manier waarop onderzoekvoorstellen werden geselecteerd, leidden tot studies die vanaf het begin af aan nauw waren afgestemd op de behoeften in gezondheidssector. De meeste studies waarvan de resultaten waren gebruikt, waren geïnitieerd en uitgevoerd door onderzoekers die tevens een functie hadden in de zorg en die zelf een rol konden spelen bij het toepassen van de resultaten, zoals lokale zorgdirecteuren of beleidsmakers. De resultaten van bijna alle, door gebruikers geïnitieerde studies, werden toegepast in de gezondheidszorg (17 van de 18). Studies werden ook vaker gebruikt als potentiële key-users betrokken werden bij het formuleren van onderzoeksvoorstellen en het ontwikkelen van aanbevelingen.

In het laatste empirische hoofdstuk analyseer ik hoe het programma voor vraaggericht en lokaal geleid onderzoek tot stand kwam en functioneerde. De ontwikkeling van het onderzoeksprogramma begon in Nederland. Na een analyse van de problemen met traditionele onderzoekssamenwerking, formuleerde een adviesraad een visie voor een meer gelijkwaardige en effectieve aanpak van Noord-Zuidsamenwerking. Samen met Ghanese partners zetten ze deze visie om in een strategie voor vraaggericht en lokaal geleid onderzoek in Ghana, dat zou worden ondersteund door een Noord-Zuid samenwerking. Bij het vaststellen van de nationale onderzoeksprioriteiten bleek dat de onderzoeksbehoeften in Ghana heel anders waren dan de prioriteiten van buitenlandse financiers en onderzoekers. Na een trage start nam het aantal ingediende voorstellen in vijf jaar tijd toe van 13 tot 94 per jaar, wat er op duidt dat dat er in Ghana een substantieel, maar deels latent reservoir aan onderzoekscapaciteit aanwezig was. In totaal werden 79 studies gefinancierd, waarvan bij een grote meerderheid de resultaten werden toegepast. Ondanks het succes kwam het onderzoeksprogramma ten einde nadat de sponsorconstellatie in Nederland uit elkaar viel en ad hoc pogingen om geld te mobiliseren in Ghana niet slaagden. De analyse laat zien dat de strategie van het onderzoeksprogramma werkte: het realiseren van een programma voor vraaggericht en lokaal geleid onderzoek in een ontwikkelingsland lijkt een effectieve strategie om onderzoekssamenwerking te organiseren, waarbij resultaten worden benut en lokale capaciteiten en instituties worden versterkt.

In het laatste hoofdstuk ga ik in op de vragen uit de inleiding, en bediscussieer ik de samenhang tussen de empirische cases, de meerwaarde van het pragmatisch procesperspectief, de belangrijkste inzichten en lessen die voortkomen uit de empirische studies en enkele wetenschappelijke en praktische implicaties. In de empirische hoofdstukken richtte ik mij steeds op wat er gedaan kan worden om de bijdrage van onderzoek aan het verbeteren van de zorg en gezondheid te vergroten. In Nederland, Guinea-Bissau en Ghana bestudeerde ik problemen met onderzoek, en concrete pogingen om onderzoek, en bijbehorende kennispraktijken, beter te organiseren.

In de discussie bespreek ik stapsgewijs in hoeverre het pragmatisch procesperspectief op KtA kan helpen om de problemen met onderzoek beter te analyseren en onderzoek beter te organiseren. Ik bespreek hoe het procesperspectief een nieuw licht werpt op vier veelbesproken problemen met KtA: 1) teleurstellingen en problemen met het gebruik van onderzoek, 2) het combineren van kennis uit onderzoek met kennis uit andere bronnen, 3) de afweging tussen de onderbouwing en de toepasbaarheid van kennis; en 4) de beperkingen van centrale kwaliteitsborging.

Ik ga verder met het bespreken van de belangrijkste inzichten en lessen die voortkomen uit de empirische analyses en de implicaties daarvan voor zowel het begrijpen van KtA-processen als voor pogingen om de bijdrage van onderzoek aan actie te verbeteren. Ik ga eerst in op de expliciete karakterisering van de vertaling van kennis in actie, en de implicaties daarvan voor het begrijpen en verbeteren van het gebruik van kennis. Vervolgens bespreek ik de zoektocht naar een balans tussen lokaal specifieke en meer generiek gerichte kennisproductie. Ik ga verder met het bespreken van de verschillende actoren en gemeenschappen die een rol spelen bij KtA en de manier waarop KtA processen worden beïnvloed door grotere structuren en dynamieken in de context. Vervolgens bespreek ik het belang van een reflexieve en responsieve aanpak, waarbij de keten van praktijken waarin kennis wordt ontwikkeld, overgedragen en toegepast, wordt gemonitord en aangepast met als doel om de bijdrage aan betere zorg en gezondheid te vergroten.

Ten slotte bediscussieer ik enkele implicaties van de inzichten in dit proefschrift voor de verdere ontwikkeling van de Evidence Based beweging, en pleit ik voor een Responsive School voor de organisatie van kennispraktijken en leerprocessen voor gezondheid.

Dankwoord

Ik vond het een voorrecht om aan dit proefschrift te werken. In de diverse cases heb ik steeds nauw samengewerkt met andere onderzoekers, belanghebbenden en beoogde gebruikers en getracht om bij te dragen aan concrete verbetering. Door die samenwerking en de vele interviews, presentaties en conferenties heb ik veel inspirerende, betrokken en bijzondere mensen leren kennen. Ik kijk terug op een prachtige tijd. Ik vond het zeer boeiend, leerzaam en verrijkend om in heel verschillende landen en situaties aan een zelfde thema te werken. Het contrast tussen de plekken waar ik werkte was groot en soms heftig. Het ene moment sprak ik met onderzoekers van het RIVM in Bilthoven over het implementeren van gezonde schoolkantines en de effectiviteit van valpreventie bij ouderen. Kort daarna vloog ik naar Guinea Bissau, een van de armste en meest instabiele landen ter wereld, en interviewde ik de directeur generaal Volksgezondheid over hoe zijn medewerkers met limoensap probeerden een cholera uitbraak te stoppen, omdat er geen andere middelen voor handen waren, en hun eigen onderzoek liet zien dat limoensap een effectief middel was. Vervolgens vloog ik door naar Ghana, waar tientallen lokale studies waren opgezet om problemen in de gezondheidszorg in kaart te brengen, nieuwe oplossingen uit te testen, en verbeteringen door te voeren, zoals het effectiever promoten van de nationale zorgverzekering, het beter implementeren van het vaccinatieprogramma, of het sluiten van een oud slavenfort dat in gebruik was als gevangenis, en een bron vormde voor de verspreiding van infectieziekten. Ik interviewde ministers, artsen, beleidsmakers, patiënten, collega-onderzoekers, verpleegkundigen en directeuren van ziekenhuizen, zorgprogramma's, GGD-en en gevangenissen en vele anderen die belang hebben bij de toepassing van onderzoek.

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About the author

Maarten Kok was born on the 11th of June 1979 and grew up in Hoorn, Noord-Holland. He graduated at Scholengemeenschap Werenfridus and at Oklahoma Union High School and went on to study physiotherapy in Amsterdam and Psychology at Vrije Universiteit. After doing research at KU Leuven in Belgium and receiving his degree in physiotherapy, he decided to focus on improving the use of research for the benefit of people's health.

He continued studying and obtained his Master degree in Public Administration (cum laude) and his Master degree in Biomedical Science, specializing in Public Health. The National Institute for Public Health and the Environment (RIVM) provided him the opportunity to conduct a PhD at the Vrije Universiteit, with a focus on improving research use. While working part time on his PhD, he started as lecturer in global health policy, management and governance. Alongside his PhD research, he was involved in multiple project on research policy, governance, priority setting, quality assurance and system strenghening and strategies for improving research use in several EU and African countries.

In 2012, he started working as assistant professor at the Health Care Governance group at the Erasmus School for Health Policy and Management. At Erasmus, he continues to conduct and coordinate studies in multiple countries. In the Netherlands, he worked with the i4i consortium on integrated health policy and research-policy simulations and collaborated with RIVM on strategies for improving and mapping research uptake. In Bangladesh, Congo and Uganda, he worked with Healthy Entrepreneurs, studying social and micro-entrepreneurship, pharmaceutical markets and telemedicine. For two years, Maarten also worked at Kingston University London on the SEE-impact study, together with the EU-funded EQUIPT project on the impact of economic analysis in the UK, Germany, Hungary and Spain. Starting in 2015, he also worked for three years as research advisor with the Desmond & Leah Tutu Legacy foundation in Cape Town, South Africa, focusing on HIV and engaging the faith sector.

In 2015, after receiving the joint Research Excellence and Innovation grant, Maarten started working in Indonesia on several joint studies linked to universal health coverage and governance. As part of the collaboration with Universitas Gadjah Mada, he supported priority setting and capacity strengthening for demand-driven and impact-oriented research. Maarten also led the NWO-funded SURe project, which, in collaboration with Cochrane International and several local partners, aimed to improve the use of research about sexual reproductive health in Cameroon, Jordan and Nigeria.

His current impact-oriented research focusses on the governance of health systems, with a specific interest in social entrepreneurship, fighting falsified and substandard medicine and improving the use of research. Maarten published several articles and book chapters. Recent publications appeared amongst others in *Lancet, Lancet Global Health, BMJ Global Health, Social Science & Medicine* and *Health Research Policy and Systems.*

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