

## **Trials and tribulations of a global health investment: the advance market commitment for pneumococcal vaccines**

Véra Ehrenstein, Daniel Neyland  
Sociology, Goldsmiths, University of London

### **Abstract**

Interventions in global health utilizing overseas aid budgets have increasingly been characterized by a narrative of investment. This paper argues that in order to understand what makes a global health investment and its return on investment, we need detailed consideration of the financial, policy and advocacy work through which they are accomplished. Calculative devices, standards and protocols, the movement and presentation of evidence, and demonstration of specific effects, each require study. We introduce the notion of evaluative situations in this paper to explore how this array of activity is arranged in and across various times and locations in order to make a case for investment, authorize investment and deliver a return. We focus on one particular global health initiative: the advance market commitment for pneumococcal vaccine.

### **Introduction**

GAVI was one of the very top performers in our root-and-branch review of the agencies that deliver British aid *because it demonstrates tangible results*. Britain will play its full part and *our support to GAVI will help vaccinate over 80 million children and save 1.4 million lives*. (GAVI, 2011, p. 1; emphasis added)

‘Investment’ and ‘to invest’ seem to have replaced ‘funding’ and ‘to fund’ when it comes to describing contemporary efforts to support health in low income regions through overseas aid. In the above quote from UK Prime Minister David Cameron, this investment logic is central to a narrative of global health initiatives whereby organizations such as GAVI<sup>1</sup> are called upon to demonstrate past and future tangible results with British aid (namely the vaccination of 80 million children saving 1.4 million lives). The logic is apparently simple: public money is to be channeled into funding schemes with the expectation of receiving a return in the future, here in the form of a global health benefit. Our suggestion is that the simplicity of this logic belies the multiplicity and complexity of processes, settings, devices and actions that enable such global health investments to take shape and a return to be accounted for. In this paper, we will focus on the web of organisations, evidential practices, and

forms of evaluation that appear to form a pre-requisite for an investment and its return to be made possible. We will argue that it is through a detailed examination of these pre-requisites entangled in advocacy, biomedical and financial work, that we can get beyond the simplicity of the investment logic and understand the challenges, demands and consequences of what makes a global health investment.

We will suggest that organisations like GAVI are pivotal in putting the investment-return logic into effect, exchanging money for doses of efficacious vaccines later dispatched across the world to administrations and healthcare centres where routine immunization takes place. But to make an investment possible and account for a return, results also need to be made demonstrable and eventually demonstrated, metrics must produce evidence of an effect and make that effect available for scrutiny and further action. We propose to make sense of this complex process through what we will term evaluative situations. It is within evaluative situations and by combining and navigating multiple evaluative situations that global health investments take shape. The paper will develop this idea by examining a specific funding scheme implemented by GAVI: the advance market commitment for pneumococcal vaccines.

In the next section, we will introduce the advance market commitment for pneumococcal vaccines. We will then further develop our definition of global health investments and evaluative situations. The paper will put these notions to work to explore three moments of the advance market commitment for pneumococcal vaccines: the making of the case, the authorization of the investment, and the delivery of results. This analysis draws on fieldwork conducted in 2014-2015 including an extensive documentary review (e.g. GAVI online archive and published epidemiological work), ethnographic observations of a research project in Burkina Faso and 31 semi-structured interviews.<sup>2</sup> In the conclusion we will explore the possible implications of this work in relation to global health and its critics.

### **The advance market commitment for pneumococcal vaccines**

The advance market commitment is a large-scale intervention deployed in low income regions at the initiative of aid donors. Said to be cost-effective, it buys and delivers pneumococcal vaccines in order to prevent certain bacterial forms of pneumonia and meningitis. As a scheme predicated on a single preventive action (vaccination), funded by northern donors for southern beneficiaries, it matches many features of 'global health' initiatives often criticized by social scientists. For example, the promotion of apparent 'magic bullets' is considered problematic in giving the illusion of a technical fix able to solve what should actually be considered complex social, political, and economic problems (Biehl and Petryna, 2013). Moreover, to be scaled-up, treatments delivered by this intervention would first have to demonstrate a quantified effect within the coercive environment of randomized controlled trials that,

in resource poor settings, stand accused of taking advantage of patients' unequal access to healthcare (Petryna, 2007) and subordinating local researchers to foreign scientific authorities (Crane, 2010). The emphasis in these interventions on displaying numerical (especially economic) outcomes is also said to divert financial support from medical practices that do not easily lend themselves to quantification (Adams, 2013; Storeng and Béhague, 2014). From this perspective, calculating and relying on numbers to improve health through overseas aid is reductionist. It reduces health to a solvable problem and patients to alienated subjects; it equates the relevance of a programme to its cost-effectiveness, and impoverishes the diversity of interventions carried out.

Although this body of work produces a powerfully stated critique, we want to proceed differently. Instead of carrying into our analysis prefigured ideas of the power of numerical evidence or assumptions regarding the consequences of translating a health intervention into a cost, we prefer the more open concept of evaluative situations to organize and explore our engagement with the evidential practices and devices that make global health investments like in the advance market commitment for pneumococcal vaccines. To do so we will first set out some initial detail on the intervention.

In 2015, more than 50 health administrations in low income countries (mostly in Africa) carried out immunization of young children against pneumococcal diseases (mainly pneumonia and meningitis caused by the bacterium *Streptococcus pneumoniae* - hereafter pneumococcus) (GAVI, 2015b). Recommended by the World Health Organization (WHO, 2012), the use of pneumococcal vaccines in low income regions eligible for GAVI's help began in 2010, after two multinational firms, GSK and Pfizer, had their pneumococcus vaccines licensed for use. This is remarkable in the recent history of immunization. Usually new vaccines would reach low income countries with a delay of at least 10 years (Greenwood 2014). Indeed, while in Europe and North America, the new products replaced a first-generation vaccine, the latter had not been available elsewhere. The trajectory of second-generation pneumococcal vaccines happened to be different because of the advance market commitment for pneumococcal vaccines.

The advance market commitment for pneumococcal vaccines was set up in the mid-2000s as a pilot initiated by a group of donors, including the UK (GAVI 2007). It was initially conceived as an intervention that would pool donor resources to create market-like competition among pharmaceutical firms who it was assumed would seek to access the pooled resource in return for creating new vaccines for diseases such as malaria prevalent in low income regions. Yet, in place of market-like competition designed to stimulate innovative research, donors eventually favoured mutually binding supply contracts with firms to provide them with incentives to scale-up the production of vaccines already in the pipeline. Contracts gave the pharmaceutical

industry the security of income required to invest in manufacturing capacity necessary to supply demand from low-income countries. In exchange, firms would accept a long-term price cap and benefit from a contractually agreed subsidy structure.

Instead of stimulating radical innovation, the advance market commitment ended up addressing pneumococcal diseases and subsidizing GSK and Pfizer's close-to-commercialization vaccine candidates, which, as we will later see, led to contentious contractual decisions (McGoey, 2014; see *Authorizing the Investment*). Here we just want to mention that pneumococcus was chosen as the target of the intervention because it was considered less risky than malaria. Donors thought they would be able to see the pilot scheme quickly translate into a tangible and visible result: the scaling-up of pneumococcal vaccine production, delivery across the world, and eventually a global health impact (interviews O). That pneumococcal diseases appeared as a less risky investment option was partly attributable to the work done by PneumoADIP, a policy-oriented public health research initiative launched by GAVI in the mid-2000s (Levine *et al.*, 2004). At the time, GAVI was providing low income countries with financial resource to purchase basic vaccines (e.g. DTP). With PneumoADIP (see *Making the Case*), it wanted to explore the possibility of supporting the purchase of a brand new product, pneumococcal vaccines<sup>3</sup>.

The encounter between the subsidy scheme and PneumoADIP translated into the advance market commitment for pneumococcal vaccines, wherein GAVI would help low income countries pay for the product and donors to the pilot would provide manufacturers with a subsidy. It took two years before the arrangement could operate (for an overview see Cernuschi *et al.*, 2011). The flow of money to subsidize the industry was subjected to procedures specific to the pilot scheme. The purchase of the vaccines and their delivery to health administrations across the world remained similar to how GAVI handled its other products (see *Delivering Return*). Countries interested in adding pneumococcal vaccines to their immunization programme applied to GAVI from 2010 onwards<sup>4</sup>. The latter would provide funds from a budget composed of governmental and philanthropic contributions regularly renewed through events like the one where David Cameron gave the speech opening this paper. GAVI then would involve UNICEF supply division to pay manufacturers and organise shipments, so that more than 100 million doses of pneumococcal vaccines could circulate in 2014, from manufacturing plants in Europe to international airports and healthcare centres across the African continent.

This succinct chronology suggests that the advance market commitment for pneumococcal vaccines emerged from negotiations around a pilot initiative, public health expertise on pneumococcal diseases, contractual work, as well as supply chain logistics, which, as the paper will demonstrate, all involved in one way or another evaluations of the vaccine.

What we want to show, then, is that from its early conception to its financing and implementation, the advance market commitment involved the production of multiple forms of numerical evidence, within a variety of settings each characterized by specific constraints, such as calculative requirements and normative assumptions about what counts as a good result. What we will unpack is the detail of these constraints and how tensions arose as this global health investment navigated and linked distinct evaluative situations. Rather than assume that we know the precise nature of the technical fix, the type of coercion exercised by calculative environments, the kinds of inequality of access or forms of subordination at stake, we instead propose to develop evaluative situations as a concept to explore the emergent characteristic of issues and their consequences in this global health investment.

### **Evaluative situations**

Three terms require some work here in order to organize our exploration of advance market commitments: market, investment and evaluative situation.

Our approach to *markets* is grounded in Science and Technology Studies and its empirical and theoretical accounts of markets in action. In particular, Callon's work (Callon, 2007; Callon *et al.*, 2002; Caliskan and Callon, 2010) examines the activity that attaches goods to consumers made ready to pay for them. Through various devices and practices, such as formula, property rights, and focus groups, market agents (sellers and buyers) and exchangeable objects are constituted. The advance market commitment does entail a market transaction, pneumococcal vaccines being sold by manufacturers to GAVI and UNICEF acting on behalf of and with health administrations. However, reducing the scheme to a purchase tends to leave aside a key process, the leverage and channeling of money from donors to those agencies, so that they can indeed operate as buyers and make the transaction happen. In Callon's vocabulary, this process would be said to participate in the making of 'marketizing agencies' (Caliskan and Callon, 2010). In place of consumer satisfaction as an end benefit, however, we want to dedicate more attention to what drives the acts of funding and implementing the purchase scheme as an intervention. It is, we argue, not so much the attachment of goods (vaccines) to users (health administrations), that is important, but expectations that the act of using these products would translate into a return, here a global health return.

Consequently we consider that, despite containing the word market, the advance market commitment for pneumococcal vaccines is a process of 'economization' different from a market transaction (Caliskan and Callon, 2009)<sup>5</sup>. It is best described as a form of *investment*, a future-oriented action that mobilizes time, money, work and attention in anticipation of valuable results in return<sup>6</sup>. To further develop our understanding of this operation, we propose to rework Callon *et al.*'s (2002) analysis of how a product has a 'career' through which it acquires qualities,

including a price, that make it a good able to be sold. These features, Callon *et al.* suggest, are actively provoked and more or less durably assigned ‘through tests or trials’ of the object (*ibid.* p. 198). Undergoing ‘process of qualification-requalification’, a product comes into being and eventually becomes tradable. Callon *et al.* use the example of orange juice to demonstrate that qualities (origin, acidity and packaging) are stabilized by different actors and skills (cultivators, tasters and marketing departments) to make the good attractive to consumers. This paper will describe a similar heterogeneity of tests and trials, and designate them under the term ‘evaluations’. We will show that, in the case of a global health investment, evaluations assess the vaccine by endowing, or investing, it with a whole series of performances, such as the reduction of pneumonia rates or a number of future lives saved. These performances, we argue, are what allow the anticipation of a significant and positive return from the vaccine (a global health return) and thus make worthwhile the mobilization of time, money, work and attention.

Evaluations, we suggest, entail calculative requirements and normative assumptions defining the performances that the evaluated object, here vaccines, must demonstrate to be said to have beneficial effects. For example, a randomized controlled trial would identify an event (e.g. disease rate) and a method (e.g. statistics) to measure the vaccine’s efficacy. It would follow a standard design to make its results acceptable in specific contexts (e.g. licensing or epidemiological research) and meaningful to specific audiences (e.g. regulators or peers). A body of literature interested in biomedicine and its history has explored in detail how such standard-based configurations emerge, operate, and evolve, talking of ‘protocols’ (Timmermans and Berg, 1997) and ‘biomedical platforms’ (Keating and Cambrosio, 2003). Our purpose is different. We will show that the advance market commitment for pneumococcal vaccines activates (in the sense of starts off and makes use of) the conventions and rules associated with clinical trials for example, before moving on to another setting within which a different form of evaluation takes place, such as the UK administration’s value for money ‘ritual’ (Power, 1997). To account for such a plurality of assessment practices, we introduce the term *evaluative situation*. We define evaluative situations as settings, in which the performances of an object under scrutiny are gauged by specific metrics, equipment and audience that incorporate a set of calculative requirements and normative assumptions. A global health investment, we argue, takes shape as it activates and navigates various evaluative situations.

Using the notion of evaluative situations enables us to organize our exploration of the advance market commitment and then attend to its consequences. The paper will show that for such an intervention to develop, it has to move from one evaluative situation (e.g. clinical trial), to another (e.g. cost-benefit analysis) and comply with their constraints. The evaluations each of these situations maintains and depends upon, partially build on each other. Circulation between evaluative settings,

we will see, does not always happen smoothly. The calculative requirements specific to one situation might be ignored and betrayed in a second evaluative situation where distinct constraints are enforced. Yet such a movement is necessary. It progressively creates an interface between public health expertise, market calculations, and organisational accountability relations, which is characteristic, we argue, of global health investments and their returns. This movement also links disparate operations, such as advocacy-based, biomedical, and financial work, so that the routine use of pneumococcal vaccines by more than 50 health administrations of low income countries can happen. In the following analysis, we group together three kinds of action within which the activation of various evaluative situations can be analysed: making the case for an intervention; authorizing the investment; and delivering return.

### **Making the case**

Making the large-scale use of pneumococcal vaccines a viable global health investment started with PneumoADIP activating different evaluative situations. Launched in the mid-2000s, the initiative was conducted for five years by a small team of epidemiologists and public relations professionals in an American school of public health. It started as policy-oriented research, which for example provided grants to monitor the occurrence of pneumococcal diseases in selected hospitals across low income countries (Knoll *et al.*, 2009). But PneumoADIP quickly became a sort of advocacy campaign to ‘make the investment case’, in the words of its protagonists (interview O), for funding and using pneumococcal vaccines.

As ‘evidence-based advocacy’ (Storeng and Béhague, 2014), PneumoADIP sought to bring pneumococcal diseases outside the small world of pneumococcus experts and encourage political intervention in favor of vaccination. In that respect, communication was crucial and several regional information meetings gathering health policy communities were organised (interview O). One resource proved important: the number of deaths prevented if vaccination was conducted in all places eligible for GAVI’s help. The capacity to save many children’s lives, 262,000 annually to be precise (Sinha *et al.*, 2007), was assigned to the future large-scale use of pneumococcal vaccines. This calculation built on results of a clinical trial that had just been carried out in the Gambia to test a vaccine candidate still under research and development (R&D). The numerical evidence was obtained by bringing one outcome of this evaluative situation, the trial, into a new, very different setting. In conference rooms, policy papers and Power Point slides, research results were translated into the language of the ‘emotive metric of “lives saved”’ in order to make the case for pneumococcal vaccines (McCoy *et al.*, 2013, p. 5).

In the Gambia, a small country turned into a privileged site for medical research in Africa (see Kelly, 2015), the trial represented the climax of an assessment effort that had been underway since the early 1980s. Pneumococcal diseases had been

subjected to a series of investigations led by a UK funding council laboratory (Greenwood, 1992), which showed that pneumonia caused by pneumococcus was a major cause of death among children along with malaria and diarrhea (interview B). The trial launched in 2000 aimed at evaluating a vaccine candidate targeting the pathogen. The product was provided by Wyeth, a US based company that was about to license in the United States the first pneumococcal vaccine for children<sup>7</sup>. The future commercial vaccine had been conceived to match the epidemiology of North America and the firm, like others, had ongoing R&D on vaccines with biological properties that were expected to better suit low income countries (WHO, 2008).

The Gambian trial was an experiment in the sense that it deployed a metrological infrastructure to contain and detect the effect of injecting a new product into people's bodies. Experimenting constituted an evaluative situation characterized by many calculative conventions and requirements. 'It was a big difficult trial' from the point of view of the investigation team (interview B). 17,000 children, were randomly assigned to two groups, one receiving the vaccine and the other a placebo, and, after vaccination, every case of pneumonia was counted for several years (Cutts *et al.*, 2005). Many challenges had to be overcome, such as flooded buildings, constant risks of sample contamination, and the overflowing of the IT system by the amount of data produced<sup>8</sup>. Experimenters struggled to get the Gambian 'resource-poor settings' to comply with 'good clinical practices' meant to ensure the quality of results (Cutts *et al.*, 2006, p. 1). The experiment sought to fit standards for randomized controlled trials and achieve a certain status as a demonstrative tool able to durably assign a measured performance to the tested product. Some of these standards were specific to the problem of pneumococcus. The experiment belonged to a network of trials, dispersed across South Africa, the US and the Philippines, all testing pneumococcal vaccines against a shared diagnosis technique<sup>9</sup>. To increase comparability, the WHO had standardized how chest radiographs should be interpreted to recognize bacterial pneumonia. This established a common definition of what ought to be measured and what ought to count as a desirable effect associated with vaccine candidates under evaluation.

When its results became public, the Gambian trial attracted the attention of those interested in pneumococcal vaccines, notably PneumoADIP, because of an unexpected outcome. Analysis showed that in the vaccinated group the mortality rate was 16% lower than in the control group (Cutts *et al.*, 2005). The number was considered substantial. It had been assumed that the experiment would detect pneumonia cases with good statistical power, but the significant reduction in mortality became the evidence 'to which actually most of the attention was dedicated', explains a statistician involved in its design (interview P)<sup>10</sup>. The trial simultaneously and straightforwardly proved that pneumococcus killed children and that the vaccine could prevent those deaths. The 16% reduction in mortality contributed to the

evidence base used to calculate that about 262,000 children's lives might be saved annually, if all countries eligible for GAVI's help routinely used a pneumococcal vaccine whose properties were close to Wyeth's candidate.

To compute such results, PneumoADIP had also to mobilize the evidential practices from another evaluative situation. One aim of the research-advocacy initiative was to assess the extent of the public health problem represented by pneumococcal diseases. In the late 2000s, its team collaborated with the WHO to collect, review, and combine epidemiological data from research conducted across the globe in order to estimate pneumococcus' 'global disease burden'. The meta-quantification used a specific metric: the number of deaths and episodes of disease (pneumonia and meningitis mainly) caused by the bacteria (O'Brien *et al.*, 2009). It showed that in 2000 about 800,000 children under five years old were dying because of the pathogen worldwide. Numbers standing for the burden represented by pneumococcus could then be put in relation with the vaccine's 16% efficacy rate against mortality, as well as with other information, such as average vaccination coverage and global demographic trends. Published in the influential journal the *Lancet*, the number of lives saved obtained through this calculation was meant to 'pull on your heartstrings', acknowledges an epidemiologist who participated in PneumoADIP (interview J).

With this advocacy work, the unexpected yet statistically robust effect of an experimental pneumococcal vaccine on mortality travelled without all the messiness of the management required to properly execute a trial. Along with other evidence also detached from the assessment practices that produced them, the efficacy rate was caught in a new evaluative situation. It helped to project and anticipate a future health impact. The numerical value obtained was judged high enough to advocate for large-scale immunization against pneumococcus in meetings and policy-oriented releases. There, the location of the trial, which had hindered compliance with good clinical practices, turned out to be a quality. The 'resource-poor setting' was emphasized because it was considered 'typical' of 'poor rural Africa', recalls its investigator (on the Gambia as 'the tropics in miniature' see Kelly, 2015, p. 306). Typicality and the projection of savable lives were demonstrative resources for a particular audience, donors and policy-makers from low income countries comparable to the Gambia. Although we could consider this work as participating in the 'marketization' of the vaccine (cf. Caliskan and Callon, 2010), attaching the good (a vaccine) to possible consumers (health administrations), we suggest that it made the vaccine ready for a global health investment. The Gambian trial had shown that a vaccine candidate was efficacious in poor rural Africa. Further calculation based on the experimental results enabled a case to be made for the vaccine's capacity to lighten the global burden of the disease. Thus, large-scale use of pneumococcal vaccines could be associated with a likely good return and became a relatively low-risk investment option.

For the advocacy work, moving between evaluative situations was productive, even though it could create tensions. For example, researchers who participated in the Gambian trial experienced blunt advocacy based on tentative research as a ‘bit crude’ (interview U). But they agreed that the extrapolation of local results and projection of a future global effect did raise awareness among health administrations and prepare the ground for financial support (interview B). When pneumococcal vaccines were eventually made available, countries eligible for GAVI’s help eagerly applied, making the introduction of the vaccine one of the quickest uptakes in the organisation’s history<sup>11</sup>. But, as we will see next, for the investment case to translate into the circulation of millions of doses of pneumococcal vaccines and their routine use in healthcare centres across Africa and elsewhere, a funding scheme had to be set up first and products licensed.

### **Authorizing the investment**

PneumoADIP encountered an experiment in overseas aid involving a set of donors – Italy, the UK, Norway, Canada, Russia and the Bill and Melinda Gates foundation – who were willing to implement an advance market commitment for vaccines (GAVI, 2007). An advance market commitment was a policy instrument aimed at improving health in poor countries that originated within academic economics. The commitment to implement it emerged in the mid-2000s among a few governments<sup>12</sup>. Contractual design started a couple of years after, once pneumococcal vaccine was chosen as the relatively low-risk focus of the pilot. Again different evaluative situations ended up being interlinked for the proposal to become an operational financial vehicle able to purchase an approved biomedical product, that is, for the global health investment to be authorized.

The advance market commitment established a set of contracts stating in advance a price cap and a subsidy structure. Making these decisions were economists, civil servants working for donors, as well as experts knowledgeable in vaccine production and representatives from various international organisations, including GAVI, who exchanged and discussed excel spreadsheets displaying the outcomes of economic models. This computer-based assessment aimed at figuring out ‘from the perspective of the manufacturers, what kind of investments may be justified under different programme structures’, recalls an economist (interview J, GAVI, 2008, Snyder *et al.* 2011). Modeling set out to simulate another evaluative situation: how companies make investment decisions. As empirical data to inform the models was scarce, a noticeable resource was the cost of goods obtained by PneumoADIP’s advocacy work, which revolved around 2-dollars a dose. This piece of information as well as assumptions regarding valuation practices within the business sector<sup>13</sup> formed constraints for running simulations and evaluating the possible effects of different price ranges. Designers of the advance market commitment eventually agreed on 3.5

dollars a dose price cap (three doses are required to be considered immunized) associated with a 3.5 dollars subsidy per dose disbursed up to an amount proportional to the supplied volume (Cernuschi *et al.* 2011). This decision was questioned by academic observers and NGOs, foregrounding the uncertainty which surrounded such an evaluation. Critics argued that due to a lack of evidence of the vaccine's production cost for the industry, the amounts might be far too generous, opening up companies to criticisms of being opaque (McGoey 2014).

But testing different prices based on simulated business behaviours was implicated in another evaluation of the vaccine on the basis of which (despite the uncertainty around production costs) donors authorized the design. Contributing a third of the total subsidy disbursed in the advance market commitment for pneumococcal vaccines, the UK was a major donor<sup>14</sup>. In DFID's (Department For International Development) corridors and paperwork, such financial support was framed as spending that should produce substantial value in return. To be funded the advance market commitment needed to navigate a new evaluative situation: administrative accountability based on value for money estimates. Using results from the Gambian trial and an extrapolation of these results, the volume of vaccine doses that could be bought with a given financial contribution was converted into quantities of prevented Disability Adjusted Life Years (DALYs). The metric, DALYs, captured the range of negative impacts caused by targeted diseases, pneumonia and meningitis, from minor disability to early death (Murray & Lopez, 1996)<sup>15</sup>. For the UK administration, the relevant indicator was the cost per DALY averted to be expected from the advance market commitment. Its numerical value was directly linked to the vaccine pricing structure, the lower the price and subsidy, the higher the number of doses purchasable for a given amount of money.

Value for money estimation was a kind of evaluation different from the experimental setting of a clinical trial and the computer-based simulation of market relationships. It created a ratio, a health impact expressed in DALYs put in the perspective of a cost. This endowed the vaccine with a new kind of performance, an economic one that would be judged good if the ratio's value was low. DFID used the composite measure less for its calculative potentialities than for its role as an evidential standard in global health<sup>16</sup>. The World Bank had established a 100-dollar benchmark, under which the cost of saving a healthy life was said to be 'excellent value for money' (interview C). DFID's 'business case', a mandatory procedure to spend UK public money, could refer to this benchmark when evaluating the subsidy scheme. In that evaluative situation, pneumococcal vaccines, whose purchase would be subsidized, came out as being 'good enough' value for money, explains the former civil servant in charge of the estimation (*ibid.*).

While the number of children's lives savable through vaccination was expected to gain support, value for money calculations were meant to contain this

enthusiasm. Like a moderator, its ratios balanced the global impact with spending. For DFID to be able to justify this spending, and to channel public money towards the pharmaceutical industry through the contracts of the advance market commitment, required on-going reporting. Such administrative accountability requirements were supposed to provide a unilateral justification (Neyland and Woolgar 2002). Yet, making expenditure transparent triggered contestations of the normative assumptions of the evaluation. After GAVI had started to deliver pneumococcal vaccines, Médecins Sans Frontières, speaking on behalf of the ‘taxpayers’, criticized the ‘scandalously expensive’ subsidy scheme (MSF, 2011). A few years later, it made itself heard again. Highlighting the issue in the media, it urged readers of British newspapers to ‘keep in mind the \$19bn made by the two companies – UK-based GSK and Pfizer – solely on sales of a vaccine that protects children against pneumonia, a condition that kills 1 million children every year’ (Elder, 2015). The NGO assessed the scheme differently from the UK government. It picked revenues (information available in the firms’ public annual review and financial reports<sup>17</sup>) as the relevant metric to gauge the price at which vaccines ought to be financed. Selling at more than 130 dollar a dose in the US where vaccines’ prices are actually becoming an issue (Rosenthal, 2014)<sup>18</sup>, pneumococcal vaccine is for a company like Pfizer a ‘blockbuster’ that had justified the acquisition of Wyeth (interview D). From MSF’s evaluative stance, the cap price agreed on in the advance market commitment was already too high and the subsidy an unjustifiable additional revenue stream. The NGO thus attempted to ‘overflow’ (Callon 2007) the framing of the global health investment by contesting how its public funding had been authorized.

When the advance market commitment became operational, GSK and Pfizer agreed to its terms and started supplying pneumococcal vaccines to countries requesting them from GAVI in exchange for the subsidy. For that transaction to happen though, the products had to be granted the status of marketable medical goods first. This involved US and European Union regulatory agencies as well as the WHO assessing efficacy and the practical, logistical constraints involved in delivering vaccine doses (Interview N)<sup>19</sup>. Regulatory decisions were taken in parallel to the funding decisions mentioned earlier. This distinct set of assessments turned the vaccines into ‘entities with pacified agency’ (Caliskan and Callon, 2010, p. 5). To become global health commodities, their behaviour in immune systems and supply chains should be predictable and reliable. This required highly standardized and controlled evaluative situations linked to biomedical regulation (an example of ‘regulatory objectivity’, Cambrosio et al. 2006).

If one considers the advance market commitment for pneumococcal vaccine only as a market transaction, then our description could stop here, with the licensing of the vaccines and their purchase by GAVI, that is, in Callon’s terms the attachment of the good to its consumers. But this would miss an important feature of the

intervention. Even though health administrations apply to GAVI for pneumococcal vaccines (partly thanks to PneumoADIP's advocacy work), even though approved doses travel across the world, and even though healthcare systems report high vaccination coverage, this does not mean the end of the intervention. The purpose of a global health investment is not to complete a transaction, but to deliver a return. And for such a return to exist and be acknowledgeable, further evaluation is necessary, as we will see next.

### **Delivering return**

The making of the investment case for the large scale use of pneumococcal vaccines, the authorization of the products and of the terms of their purchase have resulted in routine immunization against pneumococcal diseases in most of the 50 countries helped by GAVI (GAVI, 2015b). Delivering a return meant ensuring the circulation of money from the UK government budget to GSK and the logistics of packaged doses from Pfizer's plants in Ireland to customs officials in Kenya. But it also meant updating evidence of these actions. GAVI was pivotal in that respect, regularly receiving reports from health administrations on their supply needs and providing donors with proof of the proper spending of their money.<sup>20</sup> To be implemented and eventually translated into a return, the advance market commitment for pneumococcal vaccines had to continue navigating various evaluative situations.

In the late 2000s, GAVI decided to finance fifteen or so impact studies launched in places such as Malawi, The Gambia, and Kenya to monitor the effect of routine immunization against pneumococcus. In Burkina Faso, for example, the performance of Pfizer's product administered to young children since the end of 2013 was assessed by a French research agency in collaboration with Burkinabe public institutions, and a network of urban and rural healthcare centers covering 1 million inhabitants. This 'parastatal configuration' (Geissler, 2015) had conducted epidemiological surveys, one of them financed by PneumoADIP's grants, and produced evidence of disease rates prior to routine vaccination. In such evaluative situations, a metrological infrastructure was set up only to count cases, leaving the manipulation of vaccines and the diagnosis (and treatment) of patients in the hands of the healthcare system. When in a trial like the Gambia, the objective was to test a new product for an international audience of public health experts, monitoring was more in line with local health concerns. In Burkina Faso, it focused on meningitis, rather than pneumonia, as the disease had been a national problem for some time and was subjected to case-by-case surveillance. The evaluation added paperwork, better supply of reagents to conduct bacteriological analysis, and training in clinical research. It brought only a limited number of calculative constraints within routine work to ensure the quality of numerical evidence, for example the decrease (or not) in meningitis rates. The activation of similar evaluative situations across geographically distributed

sites was part of GAVI's ongoing self-assessment. The progress of the studies were discussed in the annual report on the implementation of the advance market commitment (GAVI, 2015b, p. 24), and their forthcoming outputs were expected to enter in epidemiological models used by the organisation to attribute effect to its action.

Impact studies were thus not the only sort of evaluation that helped GAVI to showing to its donors that it was delivering a return. Although the purchase of pneumococcal vaccines was enabled by the specific disbursement procedures of the subsidy, the main cost of the vaccine, the 3.5 dollars a dose, fell to GAVI's budget. As far as the organisation was concerned, it was one among other products of its 'vaccine portfolio'. The portfolio tool has a familiar financial sound (e.g. a 'capitalization device', Doganova and Muniesa 2015). It allowed evaluative comparisons, placing vaccines in competition with each other. Through the portfolio, GAVI's secretariat could make sense of the organisation as an investor in several interventions. The tool assessed how vaccines performed in relation to a series of indicators (health impact on child mortality, number of producers, supply chain capacity, prices etc.) in order to compare them and inform action. For products not yet purchased by GAVI, the portfolio helped programmatic decisions. For example, preparing the 2014-2019 'investment strategy' (GAVI, 2013), the secretariat used its evaluations in addition to consultations within countries to suggest prioritization (between cholera, rabies, meningococcal, etc.) and explore the pros and cons of forthcoming products whose efficacy might still be uncertain (e.g. malaria vaccines).

A scalar device, the vaccine portfolio enabled a 'mobilization of the world' (Latour 1987, p. 225), the vaccine world, in a highly localized site, GAVI's secretariat office in Geneva. This evaluative situation made a series of transactions visible, open to comparison and available to be subjected to further intervention. For pneumococcal vaccines, it thus pointed to targeted actions *vis-à-vis* manufacturers. One indicator was particularly useful: the relative cost, or what the person who supervises this business-like activity calls 'the cost of the health impact that you are buying' when you pay for the vaccine (interview M). Within the portfolio, return on investment took the form of a ratio between the vaccine cost for GAVI (mainly its price multiplied by the volume requested by countries) and its health impact as calculated by 'academic modeling groups' building on published research results, like those that might emerge from the impact studies, explains another staff member (interview L, Lee *et al.*, 2013). The calculation resembles the cost per DALY averted of DFID's business case, although the latter projected benefits to authorize spending, while the former dealt with operational matters. A few years after pneumococcal vaccines were made available, they became the most expensive product in the portfolio. Without interruption to the global flow of vaccine doses, it encouraged the secretariat to modify some of its contractual terms and negotiate a slight price reduction from GSK

and Pfizer (GAVI, 2014, p. 11). Delivering results from the global health investment was dynamic, better returns could be expected by continuously acting on some of the terms of the arrangement.

The evidential practice of the portfolio built on a definition of return in which donors' concerns sit centrally. Indeed what counts as a beneficial outcome depends on normative assumptions. By assessing vaccine prices against a health impact, the question of how low income governments could become able to purchase such products on their own was made absent. Captured by the notion of 'affordability', this alternative evaluative stance, advocated for by actors like MSF (2015), has only recently started to be an issue for GAVI (interview T)<sup>21</sup>. The donors-investors' point of view also overlooked things like logistical priorities within national contexts. MSF for example argued that pneumococcal vaccines were introduced in the Democratic Republic of Congo in the middle of a measles outbreak that was very difficult to get under control (Paulson, 2012). By implying that the Congolese healthcare system was probably too fragile to absorb the new (expensive) vaccine when it could not properly deliver a '30-cent measles vaccine' (*ibid.*), MSF pleaded for a reconsideration of health intervention priorities in such countries (some sociologists make a similar argument, see Roalkvam *et al.* 2013). This shows that the business of global health managed by an organization like GAVI and through scalar devices is not by default a global activity collectively conducted by all stakeholders.

The possibility for GAVI to establish an evaluative situation like the portfolio and demonstrate results to donors, whose support is necessary for its existence, required that many actors were willing to demand the vaccines, to store and distribute them, and to visit healthcare centres to be vaccinated. Symmetrically, for these actions to eventually happen different evaluative situations had to be activated. These imbricated dynamics constitute an open-ended process. For example, a research programme was launched recently in order to establish a new global etiology of pneumonia (Levine *et al.*, 2012). The multi-sited investigation could show that GSK's and Pfizer's products may not have substantially reduced the disease burden. Indeed, the vaccines were molecularly shaped to target only a limited number of bacterial strains. If it appears that such product design do not target pneumococcal diseases well enough, this could encourage the development and even licensing of radically different molecules. Several biotech firms have dedicated much effort to the task in the last few years, relying on venture capitalists (interview I). If and when these investors agree with the entrepreneurs to receive a return on investment by selling the patented technologies and products to a firm with manufacturing capacities, they might open up an opportunity for GAVI and its donors to establish a new global health investment.

Delivering a global health return, then, requires organisations like GAVI to be able to manage a number of investments in parallel and in relation to each other. In

this way, the progress of an intervention can be monitored and its relative return assessed. This can even lead to a renegotiation of the terms of any particular investment, for example when GAVI obtained lower prices for the pneumococcal vaccines. The continuing existence of multiple simultaneous investments and the possibility of new vaccine products emerging and making it to market, shows that investing in global health and monitoring the value of return cannot cease.

## **Conclusion**

This paper has addressed the economization of overseas aid for health by examining how a global health investment, the advance market commitment for pneumococcal vaccines, took shape. We suggested that the advance market commitment activated various evaluative situations which endowed pneumococcal vaccines with a series of capabilities opening up the promise and demonstration of a significant and positive return. This made the mobilization of time, money, work and attention in the purchase of pneumococcal vaccines worthwhile. The advance market commitment, evaluative situations, endowed vaccine and promise of a return are what made the investment. Evaluative situations, as we saw, entailed calculative requirements and normative assumptions that operated in settings wherein the performances of the object under scrutiny, here pneumococcal vaccines, were gauged by specific metrics, equipment and audience. We thus moved from a clinical trial in the Gambia with unexpected results, to the bureaucratic work necessary to assess the value for money of DFID spending; from computer-based economic simulations to test vaccine prices, to the regular update of the vaccine portfolio by the GAVI secretariat; from a public debate on business profits triggered by Médecins Sans Frontières in a UK newspaper to the monitoring of meningitis cases in Burkina Faso.

The evaluative situations we encountered involved statistical tests, diagnosis methods, models, value for money scales, business cases, product portfolios, surveillance networks, and clinical trials to name just a few. These assessment tools and practices, their prolific evidential activity, and the interlinking of organisations and actions they made possible were essential, we argued, in generating support for making a case, authorizing the investment, and delivering return. Each time, we encountered different means to globalize the action, through both the centralization of things happening across the globe into one site (e.g. diseases captured in the global disease burden, deaths in low income regions quantified to calculate cost per DALY averted) and the circulation of one thing across the globe (e.g. numerical evidence like the Gambian 16%, licensed products manufactured at a large-scale, a single vaccine price for all countries helped by GAVI). These transformations and flows were what enabled a return, a global health return, to be anticipated, produced and monitored. While the paper thus focused on the advance market commitment for pneumococcal vaccines as a global health investment, it also touched on other forms of investment

such as firms investing in manufacturing capacity and venture capitalists investing in start-ups. The notion of evaluative situation could be further put to work to foreground the complexity and multiplicity of these settings and the devices through which they take shape.

In our analysis there was no major disruption or resistance that jeopardized the making of the global health investment examined here and the annual flows of more than 100 million doses of pneumococcal vaccines towards low-income regions. Pneumococcal vaccines seemed to have lent themselves quite smoothly to the different evaluative situations. Yet we did pay attention to matters of concern, when attempts at establishing alternative evaluative stances could be identified. These included concerns regarding the limited participatory opportunities offered to those directly affected by the intervention, for example the health administration, in setting the terms of assessment, especially those regarding prices. Counterbalancing asymmetries in the distribution of evaluative capacity would require, we think, more evaluative situations not less.

The social science critiques we mentioned at the beginning of the paper often assume that numerical evidence has a reductionist effect. It is true that when DFID assessed the funding devoted to the purchase of pneumococcal vaccines through a value for money ratio, it selected only a few elements (cost and health impact), which built on outputs from different evaluative practices (economic simulation of prices, advocacy-oriented projection, and a clinical trial). We showed that these cuts were directed toward a specific operation, the justification of public spending, which then became open to contestation (MSF's critic) and led to actions (the delivery of licensed vaccines) involved in distinct evaluations (impact studies and the vaccine portfolio). The participants in our research did not perceive that the problem of pneumococcal diseases could be reduced to, for example, a cost-benefit analysis. Those conducting calculations, such as cost per DALY averted, were very much aware of the situatedness of their work and its interdependencies with other settings. If numerical evidence has a reductionist effect it is when social scientists decide to abstract one sort of evaluation (a trial) from the dynamic web of actions and organisations it promotes and on which it depends. By introducing the concept of evaluative situations we provide a mean to engage with the complex multiplicity of global health interventions.

## References

Adams V. (2013). Evidence-based global public health: Subjects, profits, erasures. In Biehl J., & Petryna, A. (Eds.) *When people come first: Critical studies in global health*. Princeton: Princeton University Press.

- Biehl J., & Petryna, A. (Eds.) (2013). *When people come first: Critical studies in global health*. Princeton: Princeton University Press.
- Çalışkan K. & Callon M. (2010). Economization, part 2: a research programme for the study of markets. *Economy and Society*, 39(1), 1-32
- Çalışkan K., & Callon M. (2009). Economization, part 1: shifting attention from the economy towards processes of economization. *Economy and Society*, 38(3), 369-398
- Callon M. (2007). An essay on the growing contribution of economic markets to the proliferation of the social. *Theory, Culture & Society*, 24(7-8), 139-163.
- Callon M., Méadel C., & Rabeharisoa V. (2002). The economy of qualities. *Economy and society*, 31(2), 194-217
- Cambrosio A., Keating P., Schlich T., & Weisz G. (2006). Regulatory objectivity and the generation and management of evidence in medicine. *Social science & medicine*, 63(1), 189-199
- Cernuschi T., Furrer E., Schwalbe N., Jones A., Berndt E. R., & McAdams S. (2011). Advance market commitment for pneumococcal vaccines: putting theory into practice. *Bulletin of the World Health Organization*, 89(12), 913-918
- Crane J. (2010). Adverse events and placebo effects: African scientists, HIV, and ethics in the 'global health sciences'. *Social Studies of Science*, 40(6), 843-870.
- Cutts F. T., Enwere G., Zaman S. M., & Yallop F. G. (2006). Operational challenges in large clinical trials: Examples and lessons learned from the Gambia pneumococcal vaccine trial. *PLoS Clin Trials*, 1(3), doi:10.1371/journal.pctr.0010016.
- Cutts F.T., Zaman S. M. A., Enwere G. Y., Jaffar S., Levine O. S., Okoko J. B., ... & Adegbola R. A. (2005). Efficacy of nine-valent pneumococcal conjugate vaccine against pneumonia and invasive pneumococcal disease in The Gambia: Randomised, double-blind, placebo-controlled trial. *The Lancet*, 365(9465), 1139-1146.
- Department for International Development (DFID) (2011, March). *Multilateral Aid Review: Ensuring maximum value for money for UK aid through multilateral organisations*. Retrieved from: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/67583/multilateral\\_aid\\_review.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/67583/multilateral_aid_review.pdf)
- Doganova L., & Muniesa F. (2015). Capitalization devices: business models and the renewal of markets. In M. Kornberger, L. Justesen, J. Mouritsen, & A. Koed Madsen (Eds.) *Making Things Valuable*. Oxford: Oxford University Press.
- Elder K. (2015, February 1). We want vaccines for a fair price, not free. *The Guardian*. Retrieved from: <http://www.theguardian.com/theguardian/2015/feb/01/we-want-vaccines-fair-price-not-free>

Fairhead J., Leach M., & Small M. (2006). Where techno-science meets poverty: Medical research and the economy of blood in The Gambia, West Africa. *Social science & medicine*, 63(4), 1109-1120.

Gavi, The Vaccine Alliance (GAVI) (2007, February 9). Five nations and the Bill and Melinda Gates Foundation launch Advance Market Commitment for vaccines. Retrieved from: <http://www.gavi.org/Library/News/Press-releases/2007/Five-nations-and-the-Bill-and-Melinda-Gates-Foundation-launch-Advance-Market-Commitment-for-vaccines/>

Gavi, The Vaccine Alliance (GAVI) (2008, July 10). *Advance Market Commitment for pneumococcal vaccine: Implementation working group report*. Retrieved from: <http://www.gavi.org/library/gavi-documents/amc/>

Gavi, The Vaccine Alliance (GAVI) (2011, June 13). Donors Commit Vaccine Funding to Achieve Historic Milestone in Global Health. Retrieved from: <http://www.gavi.org/library/news/press-releases/2011/donors-commit-vaccine-funding-to-achieve-historic-milestone-in-global-health/>.

Gavi, The Vaccine Alliance (GAVI) (2013, November 21-22). *Vaccine Investment Strategy*. Report to the GAVI Alliance Board, agenda item 8. Retrieved from: <http://www.gavi.org/about/governance/gavi-board/minutes/2013/21-nov/>

Gavi, The Vaccine Alliance (GAVI) (2014). *Advance Market Commitment for Pneumococcal Vaccines: Annual Report, 1 April 2013 – 31 March 2014*. Retrieved from: <http://www.gavi.org/library/gavi-documents/amc/>

Gavi, The Vaccine Alliance (GAVI) (2015a, June). *Eligibility and transitory policy: Version 0.2*. Retrieved from: <http://www.gavi.org/library/gavi-documents/policies/>

Gavi, The Vaccine Alliance (GAVI) (2015b). *Advance Market Commitment for Pneumococcal Vaccines: Annual Report, 1 April 2014 – 31 March 2015*. Retrieved from: <http://www.gavi.org/library/gavi-documents/amc/>

Gavi, The Vaccine Alliance (GAVI) (2015c, June). *Co-financing policy: Version 0.2*. Retrieved from: <http://www.gavi.org/library/gavi-documents/policies/>

Geissler P.W. (2015) Introduction: A life science in its African para-state. In P.W. Geissler (Ed.). *Para-States and Medical Science: Making African Global Health*. Durham: Duke University Press

Greenwood B. (1992). Epidemiology of acute lower respiratory tract infections, especially those due to Haemophilus influenzae type b, in the Gambia, West Africa. *Journal of Infectious Diseases*, 165(1), 26-28.

Greenwood B. (2014). The contribution of vaccination to global health: past, present and future. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 369 (1645)..

Keating P., & Cambrosio A. (2003). *Biomedical platforms: realigning the normal and the pathological in late-twentieth-century medicine*. Cambridge: MIT Press.

Kelly A. H. (2015). The Territory of Medical Research: Experimentation in Africa's Smallest State. In P.W. Geissler (Ed.). *Para-States and Medical Science: Making African Global Health*. Durham: Duke University Press.

Knoll M. D., Moïsi J. C., Muhib F. B., Wonodi C. B., Lee E. H., Grant L., ... Levine O. S. (2009). Standardizing surveillance of pneumococcal disease. *Clinical Infectious Diseases*, 48(2), 37-48.

Latour B. (1987). *Science in action: How to follow scientists and engineers through society*. Cambridge: Harvard university press.

Lee L. A., Franzel L., Atwell J., Datta S. D., Friberg I. K., Goldie S. J., ... Hansen P. M. (2013). The estimated mortality impact of vaccinations forecast to be administered during 2011-2020 in 73 countries supported by the GAVI Alliance. *Vaccine*, 31, 61-72.

Levine O. S., O'Brien K. L., Deloria-Knoll M., Murdoch D. R., Feikin D. R., DeLuca A. N., ... Scott J. A. (2012). The Pneumonia Etiology Research for Child Health Project: a 21st century childhood pneumonia etiology study. *Clinical infectious diseases*, 54(2), 93-101.

Levine, O. S., Cherian T., Shah R., & Batson A. (2004). PneumoADIP: an example of translational research to accelerate pneumococcal vaccination in developing countries. *Journal of Health, Population and Nutrition*, 268-274.

McCoy D., Jensen N., Kranzer K., Ferrand R. A., & Korenromp E. L. (2013). Methodological and policy limitations of quantifying the saving of lives: A case study of the global fund's approach. *PLoS Med*, 10(9), doi: 10.1371/journal.pmed.1001522

McGoey L. (2014). The philanthropic state: market-state hybrids in the philanthrocapitalist turn. *Third World Quarterly*, 35(1), 109-125.

Médecins Sans Frontières (MSF) (2011, June 10). GAVI money welcome but could it be more wisely spent? Retrieved from: <http://www.msf.org.uk/article/gavi-money-welcome-could-it-be-more-wisely-spent>

Médecins Sans Frontières (MSF) (2015, January). *The right shot: Bringing down barriers to affordable and adapted vaccines*. Second edition, Access campaign. Retrieved from: <http://www.doctorswithoutborders.org/article/right-shot-bringing-down-barriers-affordable-and-adapted-vaccines-2nd-edition>

Muniesa F., Doganova L., Ortiz H., Pina-Stranger A., Paterson F., Bourgoïn A., ... Yon G. (2014). *Elements for a Social Enquiry into Capitalization*. Manuscript submitted for publication.

Murray C. J. L, & Lopez A. D. (1996). *The Global Burden of Disease: A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020*. Cambridge: Harvard University Press

Neyland D., & Woolgar S. (2002). Accountability in action? The case of a database purchasing decision. *The British journal of sociology*, 53(2), 259-274

O'Brien K. L., Wolfson L. J., Watt J. P., Henkle E., Deloria-Knoll M., McCall N., ... Cherian T. (2009). Burden of disease caused by *Streptococcus pneumoniae* in children younger than 5 years: global estimates. *The Lancet*, 374(9693), 893-902.

Paulson T. (2012, May 15). Doctors Without Borders criticizes Gates-backed global vaccine strategy. Retrieved from: <http://www.humanosphere.org/global-health/2012/05/doctors-without-borders-criticizes-gates-backed-global-vaccine-strategy/>

Petryna A. (2007). Clinical trials offshored: on private sector science and public health. *BioSocieties*, 2(1), 21-40.

Power M. (1997). *The audit society: Rituals of verification*. Oxford. : Oxford University Press.

Reubi D. (2013). Health economists, tobacco control and international development: On the economisation of global health beyond neoliberal structural adjustment policies. *BioSocieties*, 8(2), 205-228.

Roalkvam S., McNeill D., & Blume S. (Eds.) (2013). *Protecting the world's children: Immunisation policies and practices*. Oxford: Oxford University Press.

Rosenthal, E. (2014, July 2). The price of prevention: Vaccine costs are soaring. *The New York Times*. Retrieved from: [http://www.nytimes.com/2014/07/03/health/Vaccine-Costs-Soaring-Paying-Till-It-Hurts.html?\\_r=0](http://www.nytimes.com/2014/07/03/health/Vaccine-Costs-Soaring-Paying-Till-It-Hurts.html?_r=0)

Sinha A., Levine O., Knoll M. D., Muhib F., & Lieu T. A. (2007). Cost-effectiveness of pneumococcal conjugate vaccination in the prevention of child mortality: an international economic analysis. *The Lancet*, 369(9559), 389-396.

Snyder C. M., Begor W., & Berndt E. R. (2011). Economic perspectives on the advance market commitment for pneumococcal vaccines. *Health Affairs*, 30(8), 1508-1517.

Storeng K. T. (2014). The GAVI Alliance and the 'Gates approach' to health system strengthening. *Global public health*, 9(8), 865-879.

Storeng K. T., & Béhague, D. P. (2014). 'Playing the Numbers Game': Evidence-based Advocacy and the Technocratic Narrowing of the Safe Motherhood Initiative. *Medical anthropology quarterly*, 28(2), 260-279

Timmermans S., & Berg M. (1997). Standardization in action: achieving local universality through medical protocols. *Social Studies of Science*, 27(2), 273-305.

Wahlberg A., & Rose N. (2015). The governmentalization of living: calculating global health. *Economy and Society*, 44(1), 60-90.

World Health Organization (WHO) (2001). *Standardization of interpretation of chest radiographs for the diagnosis of pneumonia in children*. WHO/V&B/01.35. Retrieved from:  
[https://extranet.who.int/iris/restricted/bitstream/10665/66956/1/WHO\\_V\\_and\\_B\\_01.35.pdf](https://extranet.who.int/iris/restricted/bitstream/10665/66956/1/WHO_V_and_B_01.35.pdf)

World Health Organization (WHO) (2008, December 18). *Part II: Target Product Profile (TPP) for the Advance Market Commitment for Pneumococcal Conjugate Vaccine: Supplementary Information*. Retrieved from:  
<http://www.gavi.org/library/gavi-documents/amc/>

World Health Organization (WHO) (2012, April 6). Pneumococcal vaccines – WHO Position paper 2012. *Weekly epidemiological record*, 87(14), 129-144.

---

<sup>1</sup> GAVI, the Vaccine Alliance – initially called the Global Alliance for Vaccines and Immunization – is an organisation to which governments like the UK can delegate the use of aid budget to help low income countries purchase vaccines. GAVI selects the countries eligible to apply for its financial support based on an income criterion, which at the time of writing is a Gross National Income per capita inferior or equal to \$1,500, as calculated by the World Bank (GAVI, 2015a).

<sup>2</sup> These included current and former civil servants from the UK Department for International Development (DFID) and the HM Treasury, regulatory experts, members of the GAVI Alliance secretariat, economists and lawyers involved in the design of the advance market commitment, as well as technicians, clinicians and researchers (epidemiologists, biologists, immunologists, and health economists) specialized in pneumococcus.

<sup>3</sup> Rotavirus vaccine (against diarrhea) was another product to which GAVI dedicated a similar initiative.

<sup>4</sup> Countries can also obtain from GAVI funding to ‘strengthen’ their immunization system, which means basically the purchase of equipment like syringes, fridges, vehicles, etc. (Storeng 2014).

<sup>5</sup> For the analysis of a different process of economization in relation to global health see Reubi’s work on tobacco taxation (2013).

<sup>6</sup> For a similar line of argumentation see Doganova and Muniesa (2015), Muniesa *et al.* (2014).

<sup>7</sup> See the approval history on the US Food and Drug Administration website at:  
<http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm180017.htm>  
 (last access 16 March 2016).

<sup>8</sup> It is unclear to us if the local concerns with ‘blood stealing’ documented by Fairhead *et al.* (2006) were one of challenges to overcome.

<sup>9</sup> Vaccines came from various manufacturers. Sanofi Pasteur, for example, provided the one tested in the Philippines (WHO, 2008), but the product never made it to market.

<sup>10</sup> In fact, the trial was initially supposed to measure child mortality. But one year after its launch, the end-point was changed to pneumonia cases, ‘because of practical constraints on the sample size’ (Cutts *et al.*, 2005, p. 1141).

---

<sup>11</sup> This was mentioned by many interviewees. See also the update on the introduction of the vaccine in countries supported by GAVI at: <http://www.gavi.org/support/nvs/pneumococcal/#> (last access 26 October 2015).

<sup>12</sup> ‘Statement by G7 Finance Ministers and Central Bank Governors, London, 2-3 December 2005’, available at: <http://www.g8.utoronto.ca/finance/fm051203.htm> (last access 16 March 2016).

<sup>13</sup> For a description of the kind of calculation attributed to the firms in the model see Doganova and Muniesa (2015).

<sup>14</sup> The UK is a large donor to GAVI in general.

<sup>15</sup> See Wahlberg and Rose (2015) for a history of the metric.

<sup>16</sup> In the case of pneumonia, the main pneumococcal disease, one DALY averted is almost equivalent to one death prevented (interview U), hence the importance of the Gambian results.

<sup>17</sup> For Pfizer, reports are available at:

[http://www.pfizer.com/investors/financial\\_reports/financial\\_reports](http://www.pfizer.com/investors/financial_reports/financial_reports), (last access 16 March 2016).

<sup>18</sup> See the ‘CDC Vaccine Price List’ published by the US Centers for Disease Control and Prevention available at: <http://www.cdc.gov/vaccines/programs/vfc/awardees/vaccine-management/price-list/> (last access 16 March 2016).

<sup>19</sup> See Pfizer’s vaccine approval history on the US Food and Drug Administration, the European Medicines Agency, and the World Health Organization websites at: <http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm201667.htm>; [http://www.ema.europa.eu/ema/index.jsp?curl=pages/medicines/human/medicines/001104/human\\_med\\_001220.jsp&mid=WC0b01ac058001d124](http://www.ema.europa.eu/ema/index.jsp?curl=pages/medicines/human/medicines/001104/human_med_001220.jsp&mid=WC0b01ac058001d124);

[https://extranet.who.int/gavi/PQ\\_Web/PreviewVaccine.aspx?nav=0&ID=221](https://extranet.who.int/gavi/PQ_Web/PreviewVaccine.aspx?nav=0&ID=221).

See GSK’s vaccine approval history on the European Medicines Agency and the World Health Organization websites at:

[http://www.ema.europa.eu/ema/index.jsp?curl=pages/medicines/human/medicines/000973/human\\_med\\_001071.jsp&mid=WC0b01ac058001d124](http://www.ema.europa.eu/ema/index.jsp?curl=pages/medicines/human/medicines/000973/human_med_001071.jsp&mid=WC0b01ac058001d124);

[https://extranet.who.int/gavi/PQ\\_Web/PreviewVaccine.aspx?nav=0&ID=198](https://extranet.who.int/gavi/PQ_Web/PreviewVaccine.aspx?nav=0&ID=198).

(last access 16 March 2016).

<sup>20</sup> DFID (2011) used this kind of information in the ‘root-and-branch review’ evoked in the opening of this paper.

<sup>21</sup> Currently GAVI requires the countries to co-finance a small proportion of the vaccine prices according to their national income level, but the amount this represents remains low (see GAVI, 2015a, 2015c).