

Global Governance

Revised March 11, 2013

The Meningitis Vaccine Project

Teaching Case

In December 2010 Dr. Marc LaForce, director of the Meningitis Vaccine Project (MVP), looked on with delight as the first inoculation of the new vaccine MenAfriVac (MAV) was administered to a young Burkina Faso infant as part of a countrywide vaccination program to prevent meningitis. Meningitis is an infection of the brain and spinal cord to which children and young adults are especially vulnerable. Even with rapid treatment, 5-10% die within two days of symptoms, and those who survive could suffer from brain damage, major hearing loss, and permanent cognitive disabilities.¹ At the same time the vast majority of those carrying the infectious agent, *Neisseria meningitidis*, which causes the disease remain healthy.² MAV had been developed to eliminate Group meningococcal meningitis, the most prevalent meningitis strain in Africa, which accounted for 80% to 85% of all cases.³ LaForce had joined MVP in July, 2001, shortly after the project had been created to develop a meningitis vaccine tailored for Sub-Saharan Africa. The Bill and Melinda Gates Foundation had provided a \$70 million grant to establish the MVP, a partnership between the World Health Organization (WHO) and PATH, a US-based non-governmental organization (NGO) that specialized in technology development for global health.

Meningococcal Meningitis Impact and Treatment

The dry season in Sub-Saharan Africa starts in January with the wind called “harmattan” and usually ends in early May as the rainy season begins. With the dry weather often come the outbreaks of meningitis in the “Meningitis Belt,” an area from the East African coasts of Senegal, The Gambia, Guinea-Bissau and Guinea to Ethiopia. While cases appeared every year, epidemics occurred in seven to 14 year cycles for reasons not understood.⁴ Approximately 450 million people live in the belt and about 240 million—those living in Burkina Faso, Mali, Niger, Chad, northern Nigeria, Sudan and Ethiopia—face the greatest risk for contracting meningitis.⁵ (See Exhibit 1 for a map of the Meningitis Belt.) In 1996 a major meningitis epidemic occurred across Sub-Saharan Africa, sickening 250,000 and killing 25,000.⁶ Many experts believed that the surveillance data was incomplete and that these numbers underrepresented the epidemic’s true impact. (Exhibit 2 lists meningitis epidemics in the region between 1977 to 1996.)

The disease caused devastation at the individual, family and societal levels.⁷ There were challenges of getting to a health center and even once there, many faced further challenges in actually receiving treatment. Moreover, family members accompanying ill relatives might lose days of work and subsequent income, fields might be neglected, while expenses for food and travel as well as the medicine for treatment could be costly. In 1999, approximately 60% of those living in Sub-Saharan Africa lived on less than US\$1.25 a day.⁸ For example, a Burkina Faso family affected by meningitis might incur costs equivalent of US\$90, or about three to four months of their annual income. ⁹ At the health system level, responses to the epidemic required a significant use of resources. Already weak health care systems were strained with the need to respond quickly to the infected so as to prevent death, serious complications or continued transmission. In

This teaching case was originally developed by the Harvard Global Health Institute by Rachel Gordon, MBA, Case Studies Manager, John-Arne Røttingen, MD, PhD, MSc, MPA, Visiting Professor, T.H. Chan School of Public Health, Professor of Health Policy, University of Oslo, and Steven J. Hoffman MA, JD, Visiting Assistant Professor, T.H. Chan School of Public Health, Associate Professor of Law and Director of the Global Strategy Lab at the University of Ottawa. The authors wish to acknowledge Suerie Moon, Research Director and Co-Chair, Forum on Global Governance for Health, and Susan Holman, Senior Writer for their contributions. It is used and distributed with permission by the Global Health Education and Learning Incubator at Harvard University. Cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

Teaching Case: The Meningitis Vaccine Project

addition, healthy but worried individuals who did not need care but sought services nonetheless, often impeded delivery of regular services, and slowed or stopped other public health campaigns.¹⁰ Finally, the premature deaths and adverse effect of meningitis infection on so many young people had significant long-term social and economic tolls throughout the region.¹¹

Historically people in African countries had access to polysaccharide vaccines to combat meningitis but these vaccines had significant shortcomings. They were immunogenic but only in adults and children over two years of age, leaving younger children susceptible to infection. Moreover, the vaccine was only effective for three to five years. Additionally, limited supplies coupled with a lack of understanding of when and how many individuals would be infected meant that the polysaccharide vaccines often arrived too late. Finally, these vaccines did not prevent epidemics but rather were used to prevent the spread of infection in individuals.¹²

What Can Be Done?

After the outbreaks in the late 1990s African leaders turned to the WHO to bring together global health leaders to discuss developing more effective conjugate vaccines that could be used for prevention and provide long-lasting protection. Such vaccines were under development for North America and Europe. Conjugate vaccines linked polysaccharide antigens to carrier proteins which results in a far more immunogenic product. (See Exhibit 3 for a comparison of conjugate and polysaccharide vaccines.) Multi-national pharmaceutical companies were focused on developing a vaccine for Group C meningococcal meningitis, the prevalent strain in high-income regions, rather than addressing Group A meningitis that was most prevalent in Africa. By 1999, a Group C conjugate vaccine had been introduced successfully in the UK, Canada, and other developed countries. What would it take to do the same for those who lived in Sub-Saharan Africa?

In 2000, WHO commissioned an independent study to ascertain whether it would be possible to produce a conjugate vaccine for Africa and at what cost. The study found that such a vaccine could be produced and that if production was at least 25 million annual doses the cost of goods (COGs) would be less than US\$0.40.¹³ A group of international experts, delegates, representatives from multilateral organizations and vaccine companies endorsed the initiative to develop a meningitis vaccine based on the study's conclusions. Despite the political will and momentum, a huge question remained for those involved in making an Africa meningitis vaccine a reality. Who would develop and manufacture the vaccine for the Meningitis Belt?

Prior to working with PATH and the formation of MVP, and even before WHO's study had been released, WHO staff had explored the option of creating a new company to develop the vaccine, and had even worked with the US Center for Disease Control and an academic who had experience in industry to see what this might look like. Regina Rabinovich, who worked at PATH and became involved with the meningitis project out of personal interest recalled,

“It was a major concern that we would have to wait additional 10 to 15 years until a vaccine would be developed for Africa. A big issue was scale. Serious manufacturing infrastructure would need to be committed, not just siphoning off the production excess capacity for outbreaks. Big Pharma had not yet applied the best manufacturing systems to lower the cost of goods (COGs) to where they could be competitive. The implied scale, desired price and goal—to eliminate epidemics—needed a different approach. We decided that a better strategy would be creating public-private partnership and get Pharma

Teaching Case: The Meningitis Vaccine Project

to partner with us on creating a Men A vaccine for Africa since they were already working on a multivalent vaccine.”^a

Creating the MVP

Recognizing that the project would need significant funds, the group decided to apply to the relatively new Bill and Melinda Gates Foundation for \$70 million and spent six weeks writing the proposal. Rabinovich commented, “When the grant was submitted, PATH became the prime partner because there needed to be the ability to manage product development as well as hire a committed team to manage one project, but it was always formulated as a WHO - PATH partnership. Upfront, the thought was that product development would not be so challenging - the science was known, but that this would be a delivery challenge for which WHO would take the lead.” In June of 2001, the Gates funding came through in its entirety and MVP was formed as a partnership between WHO and PATH.

Later that year, MVP recruited LaForce to be the director. Trained in internal medicine and infectious diseases, LaForce had had a long career in public health and academia. Throughout his academic career LaForce had worked on immunization programs for WHO and the US Agency for International Development (USAID). Prior to joining MVP, LaForce had led BASICSII, USAID’s flagship child survival program. Almost immediately LaForce and Luis Jodar, a WHO colleague, traveled to Africa for eight months to meet with public health officials.¹⁴

Visiting the Meningitis Belt

LaForce and Jodar met with WHO regional staff in Harare as well as other public health staff and officials mainly from Burkina Faso, Niger, Nigeria, and Mali. LaForce characterized these meetings as “informational with the purpose of better understanding from an African perspective the importance of epidemic meningitis and both the constraints and challenges in introducing a new vaccine in Africa. Price quickly rose to the top when constraints on introducing new vaccines were discussed.”

Initially the project was focused on developing a bivalent vaccine that would be effective for both Meningitis A and C, but this changed as LaForce and others reviewed the data. He remarked, “It became clear that Group A N. meningitidis was by far the key pathogen and that there was almost no Group C disease. When cost issues became more dominant it was a relatively easy to move from an A/C conjugate vaccine to a monovalent A conjugate product which was simpler and cheaper to make than a bivalent vaccine.” Rabinovich noted,

“Marc asked these countries two questions. ‘Do you want this? And if so, which form of the vaccine?’ They told him that they wanted one that targeted Group A meningitis since that could be developed more quickly than a multivalent vaccine. Thereby they had a voice in targeting the vaccine development. Then he asked, ‘What do you need this product to look like?’ And they looked at him and said, ‘It needs to be really cheap. Not a dollar. It needs to be 50 cents.’”

Later the secretary general of Niger’s Ministry of Health wrote to LaForce saying, “Please don’t give us a vaccine that we can’t afford... that is worse than no vaccine.”¹⁵

Searching for a Commercial Partner

^a A multivalent (or polyvalent) vaccine is designed to elicit an immune response either to more than one infectious agent or to several different antigenic determinants of a single agent. Definition from Glossary of Biotechnology for Food and Agriculture, UN Food and Agriculture Organization, www.fao.org/biotech/biotech-glossary/en/ accessed April 2014.

Teaching Case: The Meningitis Vaccine Project

During the time that LaForce and Jodar worked with African leaders, MVP continued its due diligence to identify a vaccine manufacturer. Initial expectations were that the manufacturer would most likely be a single-multi-national corporation with previous success in the field.¹⁶ MVP negotiated with several major commercial vaccine manufacturers in North America and Europe. Incentives considered included: a low interest loan for increased manufacturing capacity, underwriting costs of process development, production of investigational vaccine lots, and organization of clinical trials and regulatory activities; and surcharge per dose during initial years of administration to repay loan used to build the manufacturing capacity.¹⁷ Although incentives were offered, the Gates funding made the situation atypical. Dr. Marie-Paule Kieny, Director of the WHO Initiative for Vaccine Research, who worked with MVP recalled, “It was unusual in the sense that the MVP industry partners didn’t take any risk at least financial risk. We had the money and needed to define exactly what we required and then to see who was willing to work with us under our forms of conditions and the way the intellectual property was to be managed.”

However, no manufacturer was willing to develop the vaccine for a selling price less than \$2 per dose.¹⁸ Rabinovich who was actively engaged in the negotiations recalled, “I sat across from one of the big companies looking at their spreadsheets, and they told me - we CANNOT meet that price.” Yet, LaForce was convinced that “private companies were demanding a price that was too high to make meningitis prevention programs sustainable and would make them depend on an international financing model instead of keeping the conjugate vaccine price roughly equivalent to what they paid for the polysaccharide vaccine so that the countries would be able to afford the conjugate vaccine themselves.”

Part of commercial companies’ resistance to a lower price had to do with the perceived opportunity costs in developing the conjugate vaccine version for Africa. In other words, they were considering other more profitable vaccines and products. Melinda Moree, Senior Commercialization Officer at PATH, experience in commercialization issues surrounding vaccines and vaccine-related technologies explained:

“The science was broken, or in other words understood the science enough to make a product, but even so it was still going to cost somebody a fair amount of money to make a product, get it registered, put that product on the market. There was still a rather large investment needed by a company, except the chance of success of that investment actually ending up in something was much higher. In essence companies had to decide, how much of the market and profit, did they expect for risk they would take in developing the vaccine?”

LaForce elaborated, “It was a large undertaking to develop capacity for 25 million annual doses that would compete with other projects if one considered that the opportunity costs were in the neighborhood of \$200-\$500 million and choices had to be made in the context of a company’s pipeline.”^b

Moreover, the structure of WHO as an organization made up of 193 equal (one vote system) member states made negotiations with industry challenging. For example, WHO could not preferentially negotiate with a single company. Moree remarked, “We were having all our meetings jointly with WHO and the manufacturers. I used to spend all my spare time in those meetings speaking to the manufacturers in between breaks and trying to calm them down about the conditions that both WHO and other public sector groups were demanding.” In addition, the varying perspectives of WHO’s many members on the nature of the for-profit business model of pharmaceutical companies also strained negotiations.

^b As a point of comparison, Wyeth Vaccines had \$1 billion revenues after launching a 7-valent pneumococcal conjugate vaccine in US and a group C conjugate vaccine in the UK. A month long delay would have caused a loss of more than \$70 million which was the entire size of the MVP. See Luis Jodar, F. Marc LaForce, Costaante Ceearini, Teresa Aguado and Dan Granoff, “Meningococcal conjugate vaccine for Africa: a model for development of new vaccines for the poorest countries,” *The Lancet*, 361 (2003): 1902-1904.

Teaching Case: The Meningitis Vaccine Project

Oversight of MVP

Both PATH and WHO, hired full-time employees (FTE) to work on the MVP. PATH hired 12 FTE's while WHO had approximately eight. MVP headquarters were established in Ferney-Voltaire, France which was only a 20 minute drive to WHO HQ in Geneva, Switzerland. This proximity greatly facilitated face to-face meetings with WHO staff. Later, in June 2002 the Project Management Committee (PMC) was formed as result of a Memorandum of Understanding (MOU) between WHO and PATH. PMC functioned as the MVP Board and was responsible for approving budgets and plans as submitted by LaForce. The committee consisted of four members, two from PATH and two from WHO.

In addition, an Expert Panel group was also formed to offer technical advice on pharmaceutical, clinical, and regulatory strategies and issues. Members were a group of senior experts from Africa, the US and Europe with background in vaccine development, epidemiology and meningitis. The group met approximately once a year.

Let's Think Again

By 2002 it had become clear that MVP would not be able to negotiate a deal with a traditional commercial pharmaceutical company that satisfied the needs of all parties. LaForce remarked,

“A consensus among all Africans involved was that if a project like this was going to succeed – it must be sustainable which meant that price had to be one that could be funded by the countries themselves rather than being dependent on on-going donor support. To be sustainable in the view of Africans the final cost (transfer price) for the vaccine had to be in the range of US\$0.50 per dose. Fifty cents became extremely important.”

Knowing that this price point of fifty cents was critical, the next challenge became determining whether such a price point was possible. Actual calculations based on true production costs were difficult as the pharmaceutical companies considered COGs for the conjugate vaccine a trade secret. LaForce noted, “Companies that make vaccines for developed markets typically produce for niches. The vaccine production is not at huge scale so the business model is one of high cost and high end price which is exactly the opposite of what you are trying to do if you are developing a product at scale for developing countries.”

To find answers and information, LaForce turned to retired pharmaceutical executives who had focused on vaccine production and manufacturing during their careers. He recruited a team of retired executives to donate their time to WHO and help figure out the answer to this problem. LaForce explained, “They were often consulted formally and informally and operated very closely with MVP staff. They were extremely dedicated and devoted and lavished their time on the project.” Ultimately the group determined that as long as annual production consisted of 30-50 million doses, then the COGs according to LaForce, “could be as low as \$US0.25 per dose”.

To keep costs low MVP decided to find partners for each stage of the vaccine development process instead of going for one single industry partner. They broke the process into the necessary components which included: finding a manufacturer to produce the vaccine's “ingredients” (polysaccharide and tetanus toxoid); finding experienced scientists who could develop a commercially feasible conjugation chemistry process; and finding a developing country manufacturer who could implement the conjugation process and who also had the capability to scale-up production so that the finished vaccine could be widely distributed.¹⁹

Eventually MVP found the partners it needed to create the vaccine. A Dutch company, SynCo Bio Partners, agreed to produce vaccine-grade group A polysaccharide. An Italian biotechnology company, BiosYnth arranged to develop and transfer the conjugation technology. Finally, the Serum Institute of India Ltd. (SIIL), a private commercial company despite its name, was selected to both manufacture and distribute the

Teaching Case: The Meningitis Vaccine Project

vaccine at scale. Unlike European and North American pharmaceutical companies, SIIIL saw an opportunity whereas the US and European companies saw an opportunity cost. As SIIIL saw it, investment for vaccine production and acquisition of conjugate technology was an opportunity that could subsequently be applied to other projects for more profitable markets in the future. For them, the prospect of long-term sales for at least 10 years made up for the lower sale price.²⁰ Although MVP recognized the advantages, the choice to work with SIIIL was risky, according to an individual involved in the project, as SIIIL was a “company that did not have a major research focus like big Pharma and that hadn’t worked with a conjugate vaccine before, in a country that had never regulated a conjugate vaccine before.”²¹

During 2002 LaForce formed the Project Advisory Group (PAG), a select group of African public health officials chaired by Professor Francis Nkrumah, former director of the Noguchi Memorial Institute for Medical Research in Ghana, that advised the MVP on the conduct of the clinical trials.²² LaForce commented, “The Project Advisory Group was asked for serious input and their opinions were carefully considered and, at times, were closely followed. The PAG was a key source of wisdom as to what was best for the project throughout the clinical trials.” Moree noted, “It was pretty unusual for a director to take such a decision of that magnitude out of his hands, but this way the momentum for the vaccine didn’t come as a result of these other international actions but was really dependent on the actions of African leaders and decision-makers.”

A Crisis Turned Opportunity

The summer and fall of 2003 were uncertain times for MVP. Just when conjugation technology transfer was to begin, BiosYnth withdrew from the project citing other priorities and other opportunities. It was a low point for MVP. Kieny remembered, “This was quite a crisis. We were already two years into the process and we nearly needed to start from scratch.” For LaForce, the initial funding of \$70 million from the Gates Foundation “enabled us to have a long view and start again.” Later that year, MVP learned of a new conjugation method that had recently been developed and patented worldwide except in Africa by the US Food and Drug Administration’s (FDA) Center for Biologics Evaluation and Research (CBER). The new method was an improvement over the one that the MVP had originally planned to use as it promised a higher yield (of at least 40% instead of 20%²³) during the manufacturing process making COGs significantly lower.²⁴

PATH managed the licensing process and provided other assistance. PATH negotiated the technology license for Africa which required only that the project pay token royalties as the FDA donated the technology.²⁵ Additionally, PATH worked with CBER and SIIIL to facilitate training and technical support. LaForce commented, “As with the entire negotiation process for this project from the initial conversations to large Pharma to this phase, PATH added value. PATH knows how to develop products—not an easy process—understands regulatory aspects, pricing etc. WHO doesn’t have the Pharma or biz development expertise. It has plenty of legal expertise but the legal department is not set up for product development.” Kieny noted, “WHO is a big bureaucracy so decision time is longer, there is no project management culture or capacity although you do have people who from their past experience have project management capability. However, this is not the institutional culture so in terms of moving quickly including not having to go through formal bids, tendering etc. all the big purchases and this and that, a smaller non-governmental organization like PATH was much more suited to do this work. So one of the particularities was that both partners – (PATH and WHO) were able to recognize after a few months and years our different pluses and minuses to play into the project. I wouldn’t say that there was never any tension. Of course there were but nevertheless we managed to get through and play to our respective advantages.”

The new arrangement with CBER and SIIIL was unusual, but worked for several reasons. The anticipated final sale price per dose of US\$0.50 made the vaccine unattractive to other producers so SIIIL faced little

Teaching Case: The Meningitis Vaccine Project

competition, SIIIL benefited from PATH's technical assistance and funds, and the non-exclusive license was much less expensive than an exclusive license would have been, since that negotiation would have involved higher up-front costs and royalty fees.²⁶ In December 2003, SIIIL scientists visited the labs of CBER in Washington, DC, to be trained in the new production method, and in February 2004, CBER scientists went to SIIIL's facilities in India to provide additional technical support.

With the vaccine manufacture process securely in place, the MVP considered how to manage clinical trials of the vaccine. Some of the challenges with this process were logistical while others were political. Kieny outlined one issue, "The African policy makers were ready to go along with the project provided there was complete support and backing from WHO. However, the WHO leadership, especially at the regional level was not keen to give any recommendation especially before the product was pre-qualified.^c Yet, we needed to move ahead and start discussions with people on the ground to develop a deployment structure even though we hadn't gotten the complete go-ahead on our side."

Eventually in 2005, clinical trials began in India and Africa. African scientists participated in the study design and protocols.²⁷ Kieny observed, "Marc LaForce always emphasized communication and then more communication. This is key when there is so much unsaid, so much that can happen and then ruin the spirit of the collaboration. You need also to be willing to slow down some on the part of the partners in order to get there together as a partnership—willing to be persistent. Willing to listen and with the desire to serve the people that you want to serve on the front line." LaForce iterated, "WHO did not have business related experience nor infrastructure to move forward with the nitty-gritty in product development, but they attended and participated in all meetings. This is extremely important in terms of management. It is the issue of transparency and participation. You can't overestimate the importance of connectivity with WHO. For example, during trips to the region I always traveled with a WHO colleague."

Over the next few years, MVP continued to make progress at the same time that meningitis continued to be a serious health concern for the region. (See Exhibit 4 for meningitis outbreaks and deaths in the region from 2003 to 2009.) In 2006, SIIIL completed the construction of the facility that was to be used to produce the MenA vaccine. SIIIL felt comfortable using its own funds to construct the plant based on the market research that the MVP had done showing a robust future demand for the vaccine.²⁸ Phase II and III trials were launched in 2007 in India and Africa. In 2009, MVP received approval from the Drugs Controller General of India for Indian licensure after submitting data from five clinical trials. In 2010, WHO prequalified the vaccine named MenAfriVac (MAV) after reviewing safety data from three studies that involved approximately 1.2 million people from Burkina Faso, Mali, and Niger.²⁹

There were many advantages with the conjugate vaccine, MAV, over the traditional polysaccharide vaccine. Health advantages included: a more potent response at the immune level than with polysaccharide vaccines, possibility of long-lasting immunity after a single dose, safe use in children under age two and a herd immunity^d effect. Additional advantages were that MAV would be available at US\$ 50 cents per dose. This included both vaccine manufacture and associated distribution costs for routine immunization, making the program sustainable for the long-term once the first country-wide vaccinations had been completed. (See Exhibit 5 for estimated costs of well as savings associated with MenAfriVac introduction.) Moreover, MAV

^c Prequalification is an independent quality review process followed by WHO to ensure the efficacy and safety of drugs distributed or endorsed by the organization. Typically drugs must be prequalified before WHO will distribute them. For more background see, "PQP: Quality Medicines For Everyone," World Health Organization, undated and <http://apps.who.int/prequal/> both accessed April 2014.

^d Herd immunity (also known as community immunity) is when a critical portion of a community has been immunized making a disease outbreak less likely thereby offering protection even to those who have not been vaccinated. For a more thorough explanation see, "Community Immunity," www.vaccines.gov accessed April 2014.

Teaching Case: The Meningitis Vaccine Project

had been developed for only US\$100 million as opposed to standard US\$500 million that it typically cost to bring a new vaccine to market.³⁰

While the goal had always been to make MAV a sustainable vaccination program that African countries could self-sustain, financing arrangements and assumptions about sources of funding were reexamined in 2008. A case was made for Global Alliance for Vaccines and Immunisation (GAVI) to make an investment of approximately US\$370 million to cover the costs of the first vaccination campaigns, which were to focus on people aged one to 29.³¹ After these campaigns had been completed, African countries would be responsible for covering the costs of subsequent vaccination campaigns. African Health Ministers from the Meningitis Belt countries signed the Yaoundé Declaration which called for financially supporting routine immunization from Meningitis A with the new vaccine through the use of bilateral and domestic funds, bolstering meningitis surveillance and improving information shared across borders.

Rollout December 2010

WHO worked with the country partners to develop vaccination programs and prioritize vaccination campaign rollouts. LaForce described his approach,

“Working with WHO these countries never had any surprises—they were partners in every single step. WHO offered access and credibility. Relationships are the key to institutional longevity. Honesty and transparency were stressed but for these virtues to have any value, we had to establish credibility over several years.”

The goal was to fold the new vaccine into existing immunization programs, fortify disease surveillance, increase abilities to provide up-to-date information about meningitis outbreaks and develop and offer an online tool for immunization managers. To determine how to prioritize which countries got the vaccine first WHO did an analysis of disease burden, epidemic risk and various other factors. First priority countries were Burkina Faso, Mali and Niger, with GAVI Alliance support of approximately US\$30 million for vaccine purchase, planning, equipment, mass campaigns, training and evaluation.³²

Over December 2010, the MVP vaccinated almost 20 million people in the countries of Burkina Faso, Mali and Niger.³³ Rabinovich remembered telling a colleague, “I am going to Burkina Faso to participate in the ten day MenAfriVac campaign. My colleague expressed disbelief that the campaign could be done so quickly. When I came back, I told them, “You’re right they didn’t do it in ten days, they did it in eight days with volunteers and approximately 2,700 vaccination teams from the Ministry of Health making it happen.” For LaForce, the achievement of the MVP showed that “Public private partnerships can be immensely successful. There is often a bell-shaped curve to these partnerships; the MVP stands out because of the upfront funding.” His hope for the future was that “This could be used as a model of vaccine development for other neglected diseases such as shigella or typhoid fever.”

Many believed that the MVP was a novel example of vaccine development for the developing world. The development of the meningitis vaccine for Africa was unlike vaccine development efforts for measles, smallpox, and polio. Bill Gates, of the Gates Foundation, explained “All those things [vaccines for measles, smallpox and polio] were created because rich people got sick. This is the first vaccine that went through the whole process where there was no rich market, and it had to be optimized at a very low price.”³⁴ The chairman of the Department of Infection Prevention at Vanderbilt Medical School noted—even though he had no involvement in the MVP—“Doing this outside of big Pharma and developing the vaccine explicitly for the developing world is very innovative. There is nothing else like it.”³⁵

LaForce Reflects

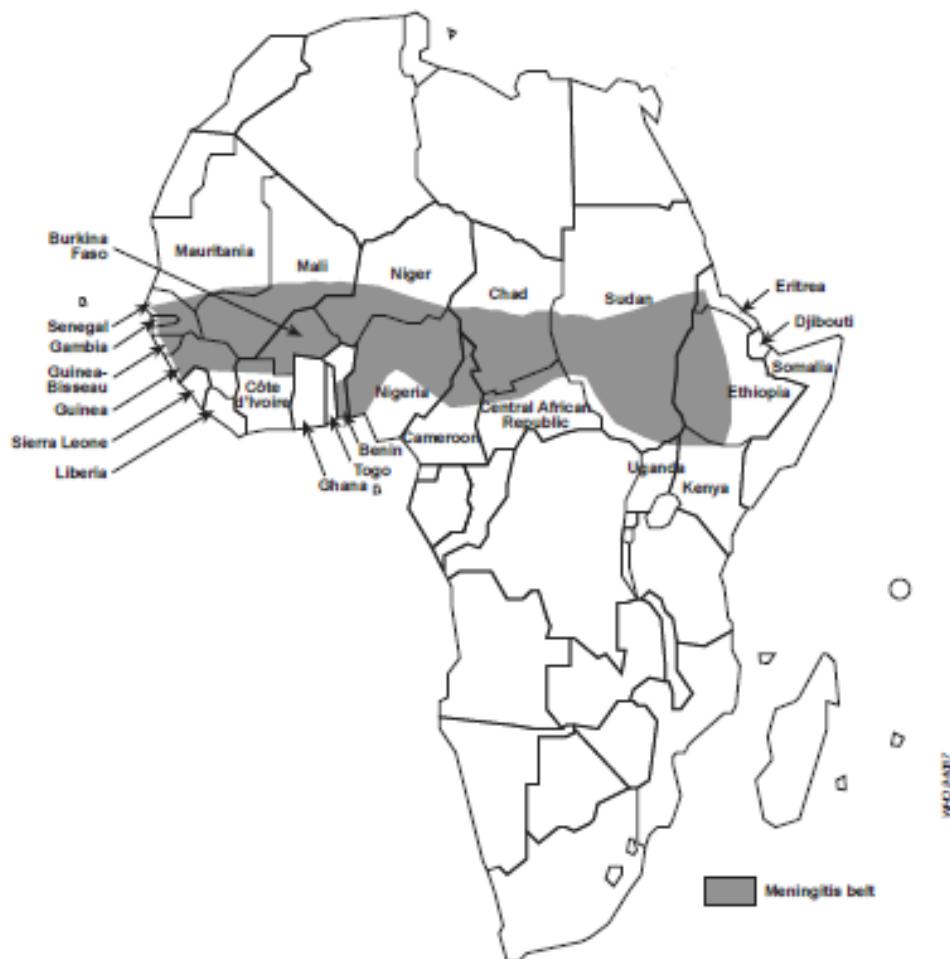
^e A copy of the declaration may be viewed at www.meningvax.org/files/yaounde_declaration_english.pdf accessed March 2014.

Teaching Case: The Meningitis Vaccine Project

Reflecting on the MVP, LaForce emphasized, “This took a lot of work from a range of actors. Creating a single company to produce the vaccine would have been simpler and more efficient than the public private partnership we created. However, that was not possible given that we needed a vaccine that was affordable for affected African countries. Luckily, we were able to establish a strong public/ private partnership that resulted in the manufacture of a Group A conjugate vaccine at the Serum Institute of India that met every international standard. Then taking full advantage of WHO’s longstanding in-country relationships with Ministry of Health staff the vaccine was efficiently introduced and widely accepted.”

Teaching Case: The Meningitis Vaccine Project

Exhibit 1: The Meningitis Belt in Africa



Source: Control of epidemic meningococcal disease, WHO practical guidelines, World Health Organization, 1998, 2nd edition, WHO/EMC/BAC/98.3, <http://www.who.int/csr/resources/publications/meningitis/whoemcbac983.pdf> accessed March 2014.

Teaching Case: The Meningitis Vaccine Project

Exhibit 2: Meningitis Epidemics in Africa: 1977-1996

Country Area	Year	No. of Cases	Attack Rate per 100,000 pop.	CFR	Serogroup
Nigeria, Zaria	1977	1,257	360.0	8.3	A
Rwanda,					
Ruhengeri	1978	1,182	223.0	4.8	A
Kigombe	1978	248	729.0	N/A	A
Burkina Faso,					
Diapaga	1979	539	517.0	10.2	C
Côte D'Ivoire					
Boundiali	1983	414	207.0	N/A	A
Ferkessedougou	1985	251	217.0	8.5	A
Korhogo	1985	367	92.0	8.5	A
Chad, N'Djamena	1988	4,542	826.0	9.5	A
Sudan	1988	32,016	133.0	N/A	A
Ethiopia	1989	41,139	83.0	3.9	A
Addis Ababa	1989	7,000	420.0	N/A	A
Kenya, Nairobi	1989	3,800	250	9.4	A
Burundi, Ruyigi	1992	1,615	608	8.0	A
Burkina Faso	1996	42,129		10	A
	1997	22,305		11.3	A
Mali	1996	7,254		11.5	A
	1997	11,228		10.1	A
Niger	1995	26,738			A
	1996	16,145		9.9	A
Nigeria	1996	108,568		11.2	A

Note: Peak attack rate per 100,000. CFR=Case fatality rate. NA = Not available.

Source: Control of epidemic meningococcal disease, WHO practical guidelines, World Health Organization, 1998, 2nd edition, WHO/EMC/BAC/98.3, <http://www.who.int/csr/resources/publications/meningitis/whoemcbac983.pdf> accessed March 2014.

Teaching Case: The Meningitis Vaccine Project

Exhibit 3: Comparison between Polysaccharide and Conjugate Vaccines

Both types of vaccine combat against viruses or bacteria but a conjugate vaccine offers several advantages from a health perspective over polysaccharide vaccines.

	(Plain) Polysaccharide Vaccines	Conjugate Vaccine
Long-term effect	Protection lasting between 3 and 5 years	Long-lasting immunity after one dose
Impact on disease spread	Symptoms may exist without adverse impact enabling asymptomatic individuals to spread the disease.	Reduces number of people harboring bacteria in body lowering number of infected people who can spread the disease
Protection for infants	No protection for those under age two	Protection for those under age two

Source: Exhibit created by case writer based on information from, Novartis, “Vaccine Development” Conjugate vs. Polysaccharide,” undated, http://www.meningitis.com/newsroom/Vaccine_Development_Conjugate_vs_Polysaccharide.pdf accessed April 2014.

Endnotes

- ¹ F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ² WHO, “Meningococcal meningitis,” Fact Sheet No. 141, November 2012, www.who.int/mediacentre/factsheets/fs141/en/ accessed July 2014.
- ³ WHO, “Meningococcal meningitis,” Fact Sheet No. 141, November 2012, www.who.int/mediacentre/factsheets/fs141/en/ accessed March 2014.
- ⁴ WHO, “Meningococcal meningitis,” Fact Sheet No. 141, November 2012, www.who.int/mediacentre/factsheets/fs141/en/ accessed March 2014
- ⁵ F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ⁶ F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ⁷ Much of this paragraph based on F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ⁸ UN Department of Economic and Social Affairs, “Rethinking Poverty: Chapter II The Official Numbers,” New York, 2009, p.21, <http://undesadspd.org/ReportontheWorldSocialSituation/2010/MediaKit.aspx> accessed March 2014.
- ⁹ F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ¹⁰ F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ¹¹ “The Role of CBER in the Success against Epidemic Meningitis in Africa,” undated, <http://www.fda.gov/downloads/BiologicsBloodVaccines/ScienceResearch/UCM289580.pdf> accessed March 2014.
- ¹² Roberts, L; “The Beginning of the End for Africa’s Devastating Meningitis Outbreaks?” *Science* (2010) 330:1446-1467, <http://www.sciencemag.org/content/330/6010/1466> accessed March 2014 and F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ¹³ Luis Jodar, F. Marc LaForce, Costaante Ceearini, Teresa Aguado and Dan Granoff, “Meningococcal conjugate vaccine for Africa: a model for development of new vaccines for the poorest countries,” *The Lancet*, 361 (2003): 1902-1904.
- ¹⁴ Bishai, David et. al., “Product Development Partnerships Hit Their Stride: Lessons From Developing A Meningitis Vaccine for Africa,” *Health Affairs*, 30, no.6 (2011): 1058-1-64.
- ¹⁵ F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ¹⁶ Bishai, David et. al., “Product Development Partnerships Hit Their Stride: Lessons From A Developing A Meningitis Vaccine for Africa,” *Health Affairs*, 30, no.6 (2011): 1058-1-64.
- ¹⁷ Luis Jodar, F. Marc LaForce, Costaante Ceearini, Teresa Aguado and Dan Granoff, “Meningococcal conjugate vaccine for Africa: a model for development of new vaccines for the poorest countries,” *The Lancet*, 361 (2003): 1902-1904.
- ¹⁸ Bishai, David et. al., “Product Development Partnerships Hit Their Stride: Lessons From Developing A Meningitis Vaccine for Africa,” *Health Affairs*, 30, no.6 (2011): 1058-1-64.
- ¹⁹ Luis Jodar, F. Marc LaForce, Costaante Ceearini, Teresa Aguado and Dan Granoff, “Meningococcal conjugate vaccine for Africa: a model for development of new vaccines for the poorest countries,” *The Lancet*, 361 (2003): 1902-1904.
- ²⁰ Luis Jodar, F. Marc LaForce, Costaante Ceearini, Teresa Aguado and Dan Granoff, “Meningococcal conjugate vaccine for Africa: a model for development of new vaccines for the poorest countries,” *The Lancet*, 361 (2003): 1902-1904.
- ²¹ Chris Elias as quoted in, Roberts, L; “The Beginning of the End for Africa’s Devastating Meningitis Outbreaks?” *Science* (2010) 330:1446-1467, <http://www.sciencemag.org/content/330/6010/1466> accessed March 2014.
- ²² The Meningitis Vaccine Project, “Timeline,” <http://www.meningvax.org/timeline.php> accessed March 2014.
- ²³ “The Role of CBER in the Success against Epidemic Meningitis in Africa,” undated, <http://www.fda.gov/downloads/BiologicsBloodVaccines/ScienceResearch/UCM289580.pdf> accessed March 2014.
- ²⁴ “The Role of CBER in the Success against Epidemic Meningitis in Africa,” undated, <http://www.fda.gov/downloads/BiologicsBloodVaccines/ScienceResearch/UCM289580.pdf> accessed March 2014.

Teaching Case: The Meningitis Vaccine Project

- ²⁵ Celia W. Dugger, “New Meningitis Vaccine Brings Hope of Taming a Ravaging Illness in Africa,” *The New York Times*, December 4, 2010, http://www.nytimes.com/2010/12/05/world/africa/05meningitis.html?_r=0 accessed March 2014.
- ²⁶ James R. Hargreaves et. al., “Making new vaccines affordable: a comparison of financing processes used to develop and deploy new meningococcal and pneumococcal conjugate vaccines,” *Lancet* 2011; 378:1855-93.
- ²⁷ F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ²⁸ Bishai, David et. al., “Product Development Partnerships Hit Their Stride: Lessons From Developing A Meningitis Vaccine for Africa,” *Health Affairs*, 30, no.6 (2011): 1058-1-64.
- ²⁹ F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ³⁰ F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ³¹ World Health Organization, UNICEF. Eliminating serogroup A meningococcal meningitis epidemics as a public health problem in Africa—an investment case for the GAVI Alliance,” www.who.int/immunization/sage/Meningitis_Investment_Case_Exec_summary.pdf accessed march 2014.
- ³² F. Marc LaForce and Jean-Marie Okwo-Bele, “Eliminating Epidemic Group A Meningococcal Meningitis in Africa Through A New Vaccine,” *Health Affairs*, 30, no.6 (2011); 1049-1057.
- ³³ The Meningitis Vaccine Project, “Timeline,” <http://www.meningvax.org/timeline.php> accessed March 2014.
- ³⁴ Bill Gates as quoted in, Celia W. Dugger, “New Meningitis Vaccine Brings Hope of Taming a Ravaging Illness in Africa,” *The New York Times*, December 4, 2010, http://www.nytimes.com/2010/12/05/world/africa/05meningitis.html?_r=0 accessed March 2014.
- ³⁵ Dr. William Schaffner as quoted in, Celia W. Dugger, “New Meningitis Vaccine Brings Hope of Taming a Ravaging Illness in Africa,” *The New York Times*, December 4, 2010, http://www.nytimes.com/2010/12/05/world/africa/05meningitis.html?_r=0 accessed March 2014.