

Contents lists available at [SciVerse ScienceDirect](http://www.sciencedirect.com)

Antiviral Research

journal homepage: www.elsevier.com/locate/antiviral

Review

Eliminating canine rabies: The role of public–private partnerships



Louise Taylor, on behalf of the Partners for Rabies Prevention

Global Alliance for Rabies Control, 529 Humboldt Street, Manhattan, KS 66502, USA

ARTICLE INFO

Article history:

Received 8 November 2012

Revised 26 February 2013

Accepted 1 March 2013

Available online 13 March 2013

Keywords:

Rabies

Canine rabies

Public–private partnerships

ABSTRACT

Canine rabies has been eliminated from industrialized countries, but infected dogs remain the principal source of human infections in the developing world. Despite the availability of effective tools for prevention and post-exposure prophylaxis, canine rabies inflicts a heavy burden on the poorest people of Africa, Asia and Latin America, resulting in more than 60,000 deaths each year. Public–private partnerships offer a new approach to the challenge of eliminating canine rabies in the developing world, by bringing together stakeholders to share responsibilities and reduce costs. The leading partnership for rabies control, the Partners for Rabies Prevention, is an informal international group that includes representatives of major health organizations (WHO, PAHO, FAO, OIE), the European Commission, universities, nongovernmental organizations, the human and animal health industries, and private global health institutions. This article describes how the Partners for Rabies Prevention is working toward the global elimination of canine rabies. It forms part of a symposium in *Antiviral Research* on the elimination of canine rabies.

© 2013 Elsevier B.V. All rights reserved.

Contents

1. The global challenge of canine rabies	314
2. Networks for the prevention of rabies	315
3. The role of public–private partnerships	315
4. Partners for Rabies Prevention: the first rabies PPP.	315
5. Achievements of the PRP	316
5.1. World Rabies Day	316
5.2. The Blueprint for Rabies Control	316
5.3. Research projects.	316
5.4. Success on the ground	317
6. Conclusions.	317
References	317

1. The global challenge of canine rabies

Rabies is a neglected disease in many resource-poor countries of Africa and Asia, where little financial support is invested in eliminating the disease in dogs, the source of almost all human cases. Although new methods for controlling dog populations would be beneficial, all of the tools needed to eliminate canine rabies, including safe vaccines for pre- and post-exposure use, are currently available. There have been numerous successes in the control of canine rabies, including its elimination from Western Europe and North America and great progress towards its elimination from Latin America and parts of Asia (Lembo et al., 2010; Rupprecht et al.,

2008). As a result, rabies is now recognized as a major neglected tropical disease whose burden can be reduced (WHO, 2010, 2013a), and it has been included in the WHO roadmap, with elimination targets set for 2015 in Latin America and 2020 for South-east Asia and the Western Pacific (WHO, 2012).

In spite of this progress, tens of thousands of people still die of rabies each year, almost all in Africa and Asia, and the disease continues to impose a heavy economic burden on developing countries (Shwiff et al., 2013). Most experts agree that the primary problem is a lack of the political will and accompanying investment that are required to eliminate rabies in unvaccinated dogs. In most rabies-endemic countries, the necessary collaboration between animal and human health sectors does not exist, and the responsibility for rabies control in dogs is not taken seriously by

E-mail address: louise.taylor@rabiescontrol.net

veterinary or public health ministries (Lembo et al., 2011). Financial support for rabies control efforts was unfortunately not included in the recent announcement of a major increase in funding for neglected diseases (Gulland, 2012). Much work therefore remains to be done to design and implement global strategies for the elimination of canine rabies (Meslin and Briggs, in press). An intersectoral “One Health” approach, uniting specialists in human and animal health, will clearly be required.

2. Networks for the prevention of rabies

One benefit of the complex epidemiological situation of rabies is the involvement of multiple stakeholders from different organizations, who can share the various financial burdens and responsibilities of prevention (Miranda et al., 2012). Experts are joining forces to increase awareness of needless deaths from rabies and push for greater local and regional efforts (Lembo et al., 2011). Networks for rabies control now include World Health Organization (WHO) Collaborating Centers for Rabies Research and regional networks; the Rabies in the Americas group (RITA); the Latin America Rabies Directors network (REDIPRA); the Rabies in Asia group (RIA); the Southern and Eastern African Rabies Group (SEARG); and other expert groups in West Africa, Asia and the Middle East.

Although these regional partnerships have been of critical importance in raising the profile of rabies, targeting the global elimination of the disease requires a wider collaboration. The Global Alliance for Rabies Control (GARC) was therefore founded in 2007 with the mission “to eliminate human deaths from rabies and to relieve the burden of rabies in animals, especially dogs” (GARC, 2012a). GARC is the first global nongovernmental organization (NGO) that focuses specifically on rabies prevention and seeks to unite existing regional networks into one global community. From the beginning, GARC has sought to include all stakeholders in rabies control, from affected communities to rabies experts, international health organizations and companies that manufacture rabies biologicals. Utilizing digital technology as a platform, GARC provides communities access to recent developments in rabies control and opportunities to contribute their expertise and experience for the benefit of all.

3. The role of public–private partnerships

There is increasing recognition that public–private partnerships (PPPs) can contribute to the global elimination of canine rabies. In the 1970s, there was mistrust and little collaboration between public institutions and private companies in the field of global public health, and nongovernmental organizations were not held in high esteem by UN organizations (Buse and Walt, 2000a). More recently, however, several factors have changed these attitudes, including disillusionment with United Nations agencies, increased understanding of the potential for “modified” markets in global health products, increased demands for corporate responsibility, and a growing appreciation that the breadth and scale of global

health problems are too great for any one sector to tackle (Buse and Walt, 2000a; WHO, 2002).

In a PPP, organizations contribute their skills towards the design and implementation of projects, guided by a shared objective. Such partnerships can be highly effective in unlocking resources to reduce the burden of neglected tropical diseases (WHO, 2002; Widdus, 2005, and see Table 1). However, questions have been raised about the role of such partnerships in global health (Reich, 2000; WHO, 2012b), especially regarding problems that can arise from the blurring of traditional distinctions between public and private sector responsibilities and their individual aims (Buse and Walt, 2000a). Points of discussion include: whether PPPs strengthen or weaken United Nations structures, such as the WHO; the precise motivations of private partners; whether program recipients should have decision-making opportunities in program development; the accountability of partnerships, and what ethical considerations and rules should guide them; and how success should be measured (Buse and Walt, 2000b; Reich, 2000). There is a need to ensure that PPPs are accountable without suppressing creativity or reducing their ability to improve the health of disadvantaged people (Reich, 2000).

In the area of rabies prevention, vaccine donations by manufacturers have provided a major boost, and many scientific and expert meetings would have been impossible without private company sponsorship. Financial and administrative support from Sanofi Pasteur has recently helped to establish new expert groups in several regions. These networks provide opportunities for rabies experts and government officials to meet and discuss how to fill program gaps and lead joint advocacy efforts for regional rabies elimination programs (Dodet et al., 2008). Many private companies have supported various aspects of the World Rabies Day campaign which brings rabies education and advocacy to communities across the world (GARC, 2012e).

Partnerships linking private companies with specific rabies control projects have also been successful. Schering Plough provided sponsorship for the “Adopt a Village” project, which significantly reduced the impact of rabies in 10 rural Indian villages through vaccination and education (Schering Plough, 2009). Through Merck Animal Health’s “dose for dose” campaign, veterinary professionals across the globe who use Merck vaccines can contribute an equal number of doses to the Afya Serengeti (Health for Serengeti) project in Tanzania, which also involves university, research and NGO partners. Since it was initiated in 1997, Merck has donated over 1 million doses of canine rabies vaccine and other resources to the project which has virtually eliminated rabies within its target region (Afya Serengeti Project, 2012).

4. Partners for Rabies Prevention: the first rabies PPP

In 2008, in an effort to move rabies higher on the international health agenda, GARC established an informal partnership, the “Partners for Rabies Prevention” (PRP) (GARC, 2010). The PRP enables key players to come together and discuss global rabies control issues (Lembo et al., 2011). Stakeholders from public and private institutions evaluate barriers to progress and combine their

Table 1
Examples of what public–private partnerships can achieve in global public health.

Global Health PPP	Achievements	Reference
Global Alliance to Eliminate Lymphatic Filariasis Roll Back Malaria Partnership	Offered treatment to 51.7% of the at-risk population, distributed donations of 1.4 billion albendazole and 1.2 billion Mectizan® tablets Saved the lives of 736,700 children in 34 African countries	Addiss and Global Alliance to Eliminate Lymphatic Filariasis (2010) Roll Back Malaria Partnership (2010)
Global Alliance for Vaccine Initiative	Raised US \$5.6 billion for vaccination in poor countries, immunized 288 million children and prevented 5.4 million deaths	Lob-Levy (2011)
The London declaration group	Announced \$785 m of investment in research and development and the strengthening of drug distribution programs, following the WHO roadmap on NTDs	Gulland (2012)

resources, including expertise and experience, communications networks, and data and educational material, to improve access to tools for rabies prevention. Individuals in the PRP are unpaid volunteers, with expertise in all of the essential disciplines required to promote advocacy, action, and research in an international context. PRP projects are implemented by subsets of partners with the best matched skills, incorporating other experts and organizations as needed.

PRP members include representatives from the WHO, Pan American Health Organization (PAHO), Food and Agriculture Organization (FAO), World Organization for Animal Health (OIE) and the European Commission; animal welfare and other NGOs; human and animal healthcare industries; researchers from WHO Collaborating Centers for Rabies Research, OIE Reference laboratories and from universities working on new rabies prevention and control tools; and representatives of global funding agencies. The composition of the PRP is fluid; additional partners and individuals are invited to contribute to specific meetings and projects, according to their focus. As the secretariat of the PRP, GARC strives to maintain the correct balance between existing organizations, to focus on the common mission and to address the most pressing problems of global rabies elimination.

Within the PRP, each partner contributes different, but complementary expertise:

- *International organizations* serve as advisors and are responsible for defining recommendations for human and animal rabies prevention. They are able to convene international assemblies with global governmental representation, and can often provide assistance to countries in emergency situations.
- *National and local governments* are essential partners for sustainable rabies prevention and control programs. Strong government cooperation is vital to develop and implement regulations and laws supporting dog control and vaccination programs.
- *Universities* link new research and technology with ongoing rabies control projects. Their expertise is invaluable when additional research or complex data analysis is needed to develop an advocacy strategy.
- *NGOs* focusing on animal health and welfare provide vital expertise on humane dog population management and responsible pet ownership. Large animal welfare organizations also have international networks of smaller organizations with expertise in culturally appropriate programs that adhere to global recommendations.
- *Private industry* remains a key partner, as rabies control programs improve access to and the need for human and animal vaccines. Without support from vaccine manufacturers, rabies elimination programs are likely to fail, and the vaccine requirements of large-scale operations are unlikely to be met without advanced collaboration. Industry's extensive market experience and global field teams can also expand capabilities for delivering resources. However, since the PRP is not bound to promote one product over others, pharmaceutical companies should not set unfair limitations on programs.
- *Major funding organizations* can provide critical financial support, and a funder's perspective as ideas are developed. Their expertise in project management and reporting enables them to strengthen projects before they start, and to continue to evaluate them to ensure success.

5. Achievements of the PRP

The PRP's first priority was to develop a roadmap for the global elimination of canine rabies (Lembo et al., 2011). This process identified six key elements for achieving the goal, including: (i) human

rabies prevention, (ii) animal rabies control, (iii) diagnostics, surveillance and reporting, (iv) education, (v) advocacy and communication and (vi) funding. The group examined each element, identified gaps in tools or implementation, and developed strategies and programs to fill those gaps, involving all necessary partners. These programs have laid the foundation for the PRP's subsequent achievements, as discussed in the following sections.

5.1. World Rabies Day

The first global initiative of the GARC/PRP was the creation of World Rabies Day (WRD), which is observed annually on September 28th (GARC, 2012e). Each WRD, volunteers host rabies awareness and action events that engage the public, school children, health and veterinary practitioners, journalists and politicians, spreading educational messages far and wide. Supported by donations from individuals, NGOs and private organizations, WRD has enabled material to be transmitted through a global network of international partners. GARC estimates that, since 2007, more than 2000 WRD-registered events in over 150 countries have helped vaccinate more than 8 million animals and distribute rabies prevention messages to over 180 million people (GARC, 2012c).

Materials in the WRD education bank are contributed, frequently translated, and are freely available to the global rabies community for education projects to modify as needed (GARC, 2012b). WRD has evolved from a single day of action into a platform for citizens, neighborhoods and governments to develop their own rabies prevention projects, supported by each other and by GARC. As a result, there have been positive signs of change in political will, with governments using WRD to announce their increased support for rabies control.

The rapid evolution of digital technology over the past decade has also allowed educational messages to reach remote places and enabled global partners in rabies control to connect with each other more easily. The PRP has hosted three free global WRD webinars on rabies prevention, connecting health professionals in 83 countries. Participants can pose questions to recognized experts and participate in a world-class conference without the need to travel (GARC, 2012d).

5.2. The Blueprint for Rabies Control

The PRP launched the Blueprint for Rabies Control online in 2010, with financial support from FAO Bamako and the European Commission (Partners for Rabies Prevention, 2011). The Blueprint now provides free, relevant, current and practical guidance on developing programs to eliminate canine and wildlife rabies. It brings together recommendations from international public health and animal welfare organizations, advice on fundraising, examples of ongoing programs and practical guidance on designing an effective and sustainable rabies control program (Lembo and Partners for Rabies Control, 2012), making previously available information much easier to access. With assistance from the PRP, the Blueprint has been translated into a further five languages.

5.3. Research projects

To strengthen evidence of the benefits of rabies control efforts, the PRP identified several gaps in available data. Without an accurate estimate of the global burden of rabies, in terms of lives lost and financial costs in rabies endemic countries, it is difficult to justify the investment of additional resources for prevention and control activities. The first estimate of the global burden of rabies has been conducted by members of the PRP, and the results have been reviewed at a 2012 WHO expert meeting (WHO, 2013b). The PRP is also conducting a worldwide survey of rabies reporting practices,

to develop better advocacy tools to improve this important, but often overlooked, aspect of disease control. Both projects have used the contact networks of PRP members to gather unpublished and published data from country experts, and to make them available to the scientific and health policy communities. The PRP is now developing simple economic models that will enable governments to calculate the costs and benefits of rabies control for their own country – a potentially huge benefit for those making difficult budget decisions.

5.4. Success on the ground

To demonstrate the feasibility of preventing human deaths by eliminating canine rabies, a search was launched for a site for a sustainable elimination project. The province of Bohol, Philippines was selected, because all of the partners required for a successful project were in place. The Bohol Rabies Prevention and Elimination Project (BRPEP) was then designed and executed by the Office of the Provincial Veterinarian, in close collaboration with other local government departments and communities. The BRPEP was supported by the governor and was largely funded by the provincial government, the UBS Optimus Foundation and GARC. It was officially launched in 2007, with the goal of empowering Bohol's 1.13 million citizens to eliminate canine rabies by 2010 (Lapiz et al., 2012).

Residents of Bohol province become stakeholders in the BRPEP by paying a small dog registration fee, which is rolled back into the program to ensure its sustainability. To date, the project has carried out mass vaccination campaigns, increased the number of animal bite treatment centers and integrated rabies education into elementary school curricula. Prior to the project, the province had the 4th highest rate of human rabies deaths in the Philippines, but in only 18 months, deaths decreased from 0.77 per 100,000 to 0. As a result of increased surveillance activities, the threat of re-introduction of rabies from surrounding endemic islands can now be managed (Lapiz et al., 2012).

Based on this success, new rabies prevention projects have been funded by the UBS Optimus Foundation and other NGOs to demonstrate the application of the Bohol model in other epidemiological settings in the Philippines, Indonesia, and Africa. The PRP has also helped choose the sites for three pilot rabies control projects funded by the Bill and Melinda Gates Foundation, which are being coordinated by WHO in Tanzania, the Philippines and KwaZulu Natal (WHO, 2009). These projects are working to control human and dog rabies, with the goal of protecting the more than 50 million people in these areas from the disease.

6. Conclusions

Even though the need for public–private partnerships in global health issues is evident, a partnership for rabies control has only recently been established. The PRP's remit is much wider than that of any regional network, since it aims to reduce the global burden of rabies, using local and international advocacy groups to persuade organizations and governments to increase resources for rabies control. The timing of this new partnership capitalizes on recent evidence that the elimination of canine-mediated human rabies is feasible (Rupprecht et al., 2008).

Through its projects and outputs, such as the 6-year-old WRD campaign, the PRP has changed the way rabies is perceived by the global community, demonstrating the possibility of improved rabies control and the PRP's willingness to help make it happen. Networks of experts have established or renewed their commitment to rabies elimination, and international agencies such as the OIE have now declared rabies a priority disease. Through the PRP, animal and human health organizations are working together in an unprecedented manner. Its inclusive nature has enabled new

partners, such as foundations, to fund major efforts in the fight against rabies. Through PRP-stimulated research and projects on the ground, there is growing evidence that rabies can be controlled and human deaths prevented. Tools such as the Blueprint for Rabies Control, new educational materials and access to digital information technology have reached those who need them most, improving the effectiveness of control strategies.

The achievements of other public–private partnerships have demonstrated the ability of this collaborative approach to unlock funding for low-priority diseases. As scientific evidence fills more gaps in knowledge, the PRP will find increasing opportunities to move the elimination of canine rabies higher on the world health agenda. With its focus on global advocacy, the PRP is showing how the public–private approach can benefit rabies control. Its success should pave the way for new regional partnerships to eliminate canine rabies.

References

- Addiss, D. Global Alliance to Eliminate Lymphatic Filariasis, 2010. The 6th meeting of the global alliance to eliminate lymphatic filariasis: a half-time review of lymphatic filariasis elimination and its integration with the control of other neglected tropical diseases. *Parasites and Vectors* 3, 100.
- Afya Serengeti Project, 2012. Afya Health for Serengeti. Retrieved February 15th, 2013, from <www.afya.org>.
- Buse, K., Walt, G., 2000a. Global public–private partnerships: part I–A new development in health? *Bulletin of the World Health Organization* 78, 549–561.
- Buse, K., Walt, G., 2000b. Global public–private partnerships: part II–What are the health issues for global governance? *Bulletin of the World Health Organization* 78, 699–709.
- Dodet, B., Africa Rabies Expert, B., Adjogoua, E.V., Aguemon, A.R., Amadou, O.H., Atipo, A.L., Baba, B.A., Ada, S.B., Boumandouki, P., Bourhy, H., Diallo, M.K., Diarra, L., Diop, B.M., Diop, S.A., Fesriry, B., Gosseye, S., Hassar, M., Kinge, T., Kombila Nzamba, T.E., Yandoko, E.N., Nzengue, E., Ramahefialao, E.F., Ratsitorahina, M., Simpire, L., Soufi, A., Tejiokem, M., Thiombano, R., Tiembre, I., Traore, A.K., Wateba, M.I., 2008. Fighting rabies in Africa the Africa Rabies Expert Bureau (AfroREB). *Vaccine* 26, 6295–6298.
- GARC, 2010. Partners for Rabies Prevention webpage. Retrieved February 15th, 2013, from <www.rabiescontrol.net/about-us/partners/partners-for-rabies-prevention.html>.
- GARC, 2012a. Global Alliance for Rabies Control website. Retrieved February 15th, 2013, from <www.rabiescontrol.net>.
- GARC, 2012b. World Rabies Day Education Bank. Retrieved February 15th, 2013, from <www.worldrabiesday.org/EN/education-bank.html>.
- GARC, 2012c. World Rabies Day Outcomes 2011. Retrieved February 15th, 2013, from <[www.worldrabiesday.org/assets/files/2011%20WRD%20Brochure%20ENG%20Web\(1\).pdf](http://www.worldrabiesday.org/assets/files/2011%20WRD%20Brochure%20ENG%20Web(1).pdf)>.
- GARC, 2012d. World Rabies Day Webinar. Retrieved February 15th, 2013, from <www.worldrabiesday.org/EN/events/wrd-webinar.html>.
- GARC, 2012e. World Rabies Day Website. Retrieved February 15th, 2013, from <www.worldrabiesday.org>.
- Gulland, A., 2012. Governments and drug companies pledge to eliminate 10 neglected tropical diseases by 2020. *BMJ* 344, e773.
- Lapiz, S., Miranda, M., Garcia, R., Daguro, L., Paman, M., Madrinan, F., Rances, P., Briggs, D., 2012. Implementation of an intersectoral program to eliminate human and canine rabies: the Bohol Rabies Prevention and Elimination Project. *PLoS Neglected Tropical Diseases* 6, e1891.
- Lembo, T. Partners for rabies prevention, 2012. The blueprint for rabies prevention and control: a novel operational toolkit for rabies elimination. *PLoS Neglected Tropical Diseases* 6, e1388.
- Lembo, T., Hampson, K., Kaare, M.T., Ernest, E., Knobel, D., Kazwala, R.R., Haydon, D.T., Cleaveland, S., 2010. The feasibility of canine rabies elimination in Africa: dispelling doubts with data. *PLoS Neglected Tropical Diseases* 4, e626.
- Lembo, T., Attlan, M., Bourhy, H., Cleaveland, S., Costa, P., de Balogh, K., Dodet, B., Fooks, A.R., Hiby, E., Leanes, F., Meslin, F.X., Miranda, M.E., Muller, T., Nel, L.H., Rupprecht, C.E., Tordo, N., Tumpey, A., Wandeler, A., Briggs, D.J., 2011. Renewed global partnerships and redesigned roadmaps for rabies prevention and control. *Veterinary Medicine International* 2011, 923149.
- Lob-Levy, J., 2011. Contribution of the GAVI Alliance to improving health and reducing poverty. *Philosophical transactions of the Royal Society of London. Series B, Biological sciences* 366, 2743–2747.
- Meslin, F.X., Briggs, D., in press. Eliminating canine rabies, the principal source of human infection: What will it take? *Antiviral Res.* <http://dx.doi.org/10.1016/j.antiviral.2013.03.002>.
- Miranda, M.E., Miranda, N.L.J., Briggs, D.J., 2012. Public and private funding sources for sustainable rabies control programmes Rabies Control – Towards Sustainable Prevention at the Source. OIE Global Conference on Rabies Control, Incheon–Seoul (Republic of Korea), 7–9 September 2011, Compendium. Partners for Rabies Prevention, 2011. Blueprint for Rabies Prevention and Control. Retrieved February 15th, 2013, from <www.rabiesblueprint.com>.

- Reich, M.R., 2000. Public–private partnerships for public health. *Nature Medicine* 6, 617–620.
- Roll Back Malaria Partnership, 2010. Saving Lives with Malaria Control: Counting Down to the Millennium Development Goals, Progress and Impact Series. World Health Organization. rbm.who.int/ProgressImpactSeries/docs/report3-en.pdf.
- Rupprecht, C.E., Barrett, J., Briggs, D., Cliquet, F., Fooks, A.R., Lumlertdacha, B., Meslin, F.X., Muler, T., Nel, L.H., Schneider, C., Tordo, N., Wandeler, A.I., 2008. Can rabies be eradicated? *Developments in Biologicals* 131, 95–121.
- Schering Plough. (2009). Schering–Plough announces sponsorship of rabies-control projects in India. Retrieved February 15th, 2013, from <www.reuters.com/article/2009/11/02/idUS145529+02-Nov-2009+PRN20091102>.
- Shwiff, S., Anderson, A., Hampson, K. in press. Potential economic benefits of eliminating canine rabies. *Antiviral Res.* <http://dx.doi.org/10.1016/j.antiviral.2013.03.002>.
- WHO, 2002. Dr Gro Harlem Brundtland's Address to the Fifty-fifth World Health Assembly. Retrieved February 15th, 2013, from <www.who.int/director-general/speeches/2002/english/20020513_addresstothe55WHA.html>.
- WHO, 2009. Bill & Melinda Gates Foundation fund WHO-coordinated project to control and eventually eliminate rabies in low-income countries. Retrieved February 15th, 2013, from <www.who.int/rabies/bmgf_who_project/en/>.
- WHO, 2010. Working to overcome the global impact of neglected tropical diseases. First WHO report on neglected tropical diseases. WHO, Geneva. whqlibdoc.who.int/publications/2010/9789241564090_eng.pdf.
- WHO, 2012. Accelerating work to overcome the global impact of neglected tropical diseases. A roadmap for implementation. WHO, Geneva. <www.who.int/neglected_diseases/NTD_RoadMap_2012_Fullversion.pdf>.
- WHO, 2013a. Sustaining the drive to overcome the global impact of neglected tropical diseases. Second report on neglected tropical diseases. WHO, Geneva. <www.who.int/neglected_diseases/2012report/en/index.html>.
- WHO, 2013b. WHO Expert Consultation on Rabies (2012: Geneva, Switzerland), WHO Technical Report Series 931. WHO, Geneva.
- Widdus, R., 2005. Public–private partnerships: an overview. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 99 (Suppl. 1), S1–8.