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Rational rollout of new medicines for diseases of poverty

By Roger Bate

Increasing access to medicines for diseases that primarily affect the poor, such as malaria and tuberculosis (TB), involves a complex interplay of private- and public-sector efforts—some of which are often ignored in public debates over how to best improve access. Producing new medicines is a necessary first step, and companies can be given incentives to do so through a variety of mechanisms. But production is only part of the story. Government policies largely determine how or whether effective new medicines are provided to the people most in need, and government requirements for local clinical trials, filing dossiers, and registering new drugs can create high costs and sometimes barriers to access. Governments with high disease burdens must optimize their policies to ensure safe and timely access to new medicines. Western nations could encourage such action at the 2015 World Health Assembly; this is the humanitarian thing to do, but Western self-interest should also drive such an effort. Escalating drug resistance does not respect national boundaries, and extremely drug-resistant variations of some diseases of poverty ultimately threaten the poor and the wealthy alike.

Treating the hundreds of millions around the world with infectious diseases is challenging even when effective medicines are cheaply available. For tuberculosis and malaria, two leading infectious killers, ensuring access to medicines involves a complex interplay of private-sector development and government implementation. Together, the high sums of investment required to develop new medicines, the range of stakeholders involved, the stringent ethical framework under which medical research must be conducted, the lack of market incentives to combat diseases of poverty, and other factors limit or slow each vital step in the process, from research to development and manufacturing to the delivery of new products. When new products finally reach the market, inadequate public health infrastructure feeds the emergence of medicine resistance[1] as people receive incomplete or substandard treatments.

These problems are manifest in current efforts to treat TB and malaria, which together kill more than two million people each year, mainly in low- and middle-income countries. Each death is a personal tragedy that could have been avoided with proper treatment. The fact that large numbers of preventable deaths occur each year fuels a great deal of frustration in the public

[1] At a genetic level, microbes select for mutated versions that enable them to survive against medicines designed to kill them. This is a natural process, and resistance is inevitable over time. Early antibiotics like penicillin are now useless against infections they previously treated. Natural resistance is unfortunately enhanced if inferior medicines are used or if treatment is interrupted since the microbe might receive sublethal doses of otherwise-effective medicines. In the case of TB, treating the illness with a single drug essentially guarantees that resistance will develop, which makes combination therapy essential.

health community, some of which is directed at the pharmaceutical companies that produce new medicines. Ironically, anger is not directed at companies that do *not* make these medicines.

Certainly, medicines for diseases of poverty might be developed and manufactured more quickly, and made available more cheaply, but the activities of drug companies alone do not determine the pace at which new medicines are brought to market within developing countries, let alone whether patients actually receive them. When working to accelerate access to key medicines for diseases of poverty, it is crucial to look not only at pharmaceutical production and pricing policies, but also at government policies and actions that determine access within low- and middle-income countries.

Research and Development

There is little profit in developing medicines for TB and malaria, so either research and development costs are absorbed by for-profit companies or donor governments or drugs are priced so that costs can be recouped from the few segments of the market that can pay. Historically, while much truly original, or "blue-skies," research is publicly funded, early-stage product development is almost never covered by government donors. This means that while research may be encouraged by the public sector, actual product development is not. Private companies have few incentives to create products that are safe and effective.

Nevertheless, over the past 20 years, pharmaceutical companies have developed medicines for diseases of poverty with little hope of profit. For example, Novartis signed a memorandum of understanding with the World Health Organization (WHO) to state that it would recover only costs—and not profit—from the sale of its breakthrough antimalarial artemisinin-based combination therapy (ACT), Coartem (Spar and Delacey 2008). Similarly, Sanofi (2013) developed a different ACT without expectation of significant gains.

Both of these medicines have since been copied by myriad generic firms, most of which have razor-thin margins to remain profitable if they make the product properly. Understanding the costs that are absorbed by for-profit pharmaceutical firms in the process of developing new malaria products, the Medicines for Malaria Venture (a private-public partnership) defrays some of the private sector's R&D costs and helps coordinate research and is on track to deliver new combination medicines over the next decade (Zaracostas 2015).

While a few major pharmaceutical companies have research underway into TB medicines, others have closed TB research programs in what one advocacy group has described as "running for the exits" (Treatment Action Group 2014). Since rifampicin was introduced in 1967, only two new TB medicines have been introduced—bedaquiline (trade name Sirturo), produced by Janssen Pharmaceuticals, and delamanid (trade name Deltyba), produced by Otsuka Pharmaceutical. Both are approved for use exclusively to treat patients with multidrug-resistant strains of TB. The not-for-profit TB Alliance currently manages the world's largest portfolio of TB drug candidates, with six different TB treatment regimens currently in various phases of testing (from two regimens in Phase 1 to one regimen in Phase 4) via five active clinical trials (TB Alliance 2015).

However, the development of new medicines is simply an intermediate step in getting improved treatments to patients. In some cases, even after new treatments have been discovered, the financing needed to move those medicines through the marketplace has not materialized.

Manufacturing and Licensing Production

TB and malaria medicines have to be made precisely, or they will not work. For example, rifampicin, a first-line TB treatment,[2] can exhibit solubility problems when not made to precise specifications (Bate et al. 2013). Manufacturing precision comes at a cost, especially when the use of single medicines readily breeds resistance to

[2] These are the drugs initially given to patients that present with symptoms of a disease. For TB, this is typically a combination of isoniazid, rifampicin, ethambutol, and pyrazinamide.

that medicine. TB treatment requires a combination of medicines, often packaged within a single pill or capsule. Such fixed-dose combination therapies (FDCs)[3] are the backbone of TB, malaria, and HIV treatment, and few manufacturers can make them consistently well.

Tuberculosis and malaria together kill more than two million people each year, mainly in low- and middle-income countries.

Eli Lilly recently chronicled its experience with technology transfer for two multidrug-resistant TB (MDR-TB) medicines, which helped to increase the available supply of these medicines and brought the loci of manufacturing into high-burden countries, including India and Russia (Palmer 2014). Even after the company invested in plant production to improve the manufacturing of other local producers, some of those producers were not guaranteed to price the drugs competitively enough to ensure access. Sometimes this was no fault of those companies but was a consequence of patients' not being diagnosed by the public health system.

Probably the best example of how licensing production can lower cost and increase access is with an HIV medicine. Gilead licenses its HIV medicine Viread (tenofovir) to several generics companies; Gilead retains its patent rights in rich countries but provides technical assistance in making tenofovir to be sold in poorer countries in return for a 5 percent royalty. The companies it has licensed to have produced far more tenofovir than Gilead has over the past decade (Bate 2012).

The tenofovir example also demonstrates some key issues relating to pricing. While Gilead charges thousands of dollars a year per patient for treatment with its drug in the US, its licensee partners' pricing in poorer countries is far lower.

[3] To lower the chances that effective drugs become ineffective because of drug resistance, drugs are often given in combination. And to ensure these drugs are taken together, they are combined in single pills called FDCs. For example, artemether-lumefantrine is the most important FDC for treating malaria.

Such differential pricing is both efficient and equitable (Bate and Boateng 2007). However, it is far harder to recoup the costs of development for drugs for TB and malaria because there is no significant Western market. That means pricing becomes even more important to ensure that products with high social value are paid for as much as possible by individual users or, if they cannot afford anything, by donors and their governments. The aim should be to treat as many patients as require treatment and to ensure an adequate supply of medicine to meet that demand. Indeed, one of the lessons of the Lilly technology transfer effort is that diagnosis by local health officers is often inadequate, meaning that, while need is high, effective demand is low.

Companies have followed different routes to try to meet demand and also make enough returns from sales to at least recover the costs of new drug development. Efforts against most diseases with a small global footprint, such as river blindness, have often involved drug donations, where companies aim to achieve enough public goodwill from their actions that they are not worried about covering costs of drug production and delivery (Farrell 2013).

It is important to note that companies have historically liked donation programs since they can be generous—as Merck was in its Mectizan/ivermectin river blindness program (Colatrella 2008)—without undermining their normal pricing and licensing models. What is harder for companies, although it is economically rational, is to license generics companies to make the medicines they have developed at a lower price than they can, or to produce far larger amounts themselves and price the product far lower—something companies began doing early this century.

For major diseases, a donation approach is ineffective. Although it may do good by increasing access in the short term, the cost of providing many tens of millions of treatments annually for free is prohibitive and, more important, unsustainable.

So nonzero pricing is important. But how much to charge? Malaria provides some lessons. The pricing of the best antimalarials was differentiated for most of the last decade with the small but moderately well-off private markets of

TB Drug Efforts

In an announcement heralded by some as a "game changer," in December 2014 Janssen made public its intent to provide $30 million worth of bedaquiline to treat MDR-TB. The medicines—enough to treat roughly 30,000 MDR-TB patients—will be delivered to patients through USAID-supported programs in low-income countries over a four-year period. More than 100 countries are eligible to access the medicines (Stop TB Partnership 2014).

Such donations will serve a distinct benefit to the individual patients fortunate to receive them, and Janssen deserves praise for its initiative. But with nearly a half million people developing MDR-TB each year—and nearly 80 percent not receiving diagnosis or treatment—donation programs will never be a viable, sustainable solution to the MDR-TB problem.

Africa and Southeast Asia being charged one price (on average, about $8 per treatment) and major donor-supported public programs being charged a lower price ($1–2). Novartis and Sanofi, the innovators in the malaria drug space, executed this policy until international donors in the private sector—including the Global Fund to Fight AIDS, TB, and Malaria (GFATM) and the Gates Foundation—tried a mass treatment program (the Affordable Medicines Facility-malaria, or AMFm) where prices dropped to near $1 (and numerous providers, notably from India, entered the market to supply the subsidy system).

The program increased access to better antimalarials, but there were many negative spillover effects—theft, diversion of legitimate products, and substandard production all increased. These problems should be borne in mind in any future mass treatment efforts. One positive from the AMFm was an equitable allocation of responsibility between donors and public-sector buyers. Donors took on the responsibility to buy medicines and get those medicines into the hands of private pharmacies, which increased certainty for manufacturers, encouraging new entrants, lowering prices, and increasing access for the poorest patients.

Additionally, pricing was differentiated so that those more able paid more and those less able paid less (or, rather, those negotiating for the poorest and most vulnerable paid less).

Regulatory Requirements

The regulatory approval process actually starts long before a drug is submitted for review. Clinical trials—which are expensive and take years to complete—must be conducted in accordance with not only policies set by stringent regulatory agencies like the US Food and Drug Administration (FDA) and the European Medicines Agency (EMA) but also the regulatory environment in each of the targeted markets.

These policies are too often duplicative and act as a barrier to access. For example, regulatory policies in India—where nearly 1,000 people die daily from TB and which has by far the highest prevalence of TB drug resistance—have made it difficult to bring new MDR-TB medicines to market. Government regulations require local clinical trials to be conducted before the national drug regulatory authority will consider approving a new medicine in the country, even when the medicine has undergone clinical trials in other countries and has already been approved by stringent drug regulatory authorities such as the FDA or EMA (Indian Ministry of Health and Family Welfare 2013). This practice sets an unreasonably high barrier for new treatments to reach Indian patients in need.

According to an article in the *Wall Street Journal*, in 2013 the Indian government denied approval to sell Janssen's bedaquiline because it had not been tested through local clinical trials, despite the fact that the US FDA fast-tracked the drug's review and approved it in 2012. The same article reported that Otsuka Pharmaceutical

engaged the Indian government in 2012 in an effort to recruit patients in clinical trials for its new MDR-TB treatment, delamanid, but was rebuffed. After months of discussions with Indian drug regulators and appeals to the Indian Supreme Court, Otsuka was never approved to conduct delamanid trials (Anand 2015).[4]

When a new medicine is ready for distribution, proper pharmacovigilance must be in place.

This practice of requiring local clinical trials then stonewalling those same trials puts drug developers in a Catch-22 situation and ultimately harms patients—and there is a surely an element of corruption at play. In May 2012, the Indian Parliament published a report concluding that Central Drugs Standard Control Organization (CDSCO) officials illegally colluded with domestic and foreign pharmaceutical firms to speed up the medicine approval process (Indian Parliamentary Standing Committee 2012). In one chilling finding, the report found that the CDSCO approved at least 31 drugs that had never undergone adequate clinical trials. The report also cited several examples of bogus product letters recommending CDSCO approval. These letters were purportedly written by independent experts thousands of miles apart, yet were "word to word identical."

Such practices are obviously unacceptable, but there is at least one reason why they happen: the incredibly poor performance of CDSCO in addressing day-to-day functions like product registration. Indeed, while efforts to illegally speed up approvals were underway, normal practice was slowed even further.

One rebuke was not enough. Indian government parliamentary committees continued to publish reports damning CDSCO, and according to insiders within the Indian drugs industry who wish to remain anonymous, to this day the agency continues to delay registering products until the right bribe is paid.

To put these policies into perspective, a recent analysis by the Tufts Center for the Study of Drug Development estimated that the average out-of-pocket clinical cost for an approved new medicine was $965 million in 2013. Human trials are only a component of this amount and do not represent the total (which covers "all indications, long-term animal testing, overhead, CMC [chemistry manufacturing controls] during clinical testing and prior to first approval"), but the point is that the cost is significant—and government policies that create the need for duplicative trials are prohibitive (DiMasi 2014).

If every country required locally conducted clinical trials to register new medicines, as India often does, investment in pharmaceutical R&D would slow or, for some conditions or diseases, grind to a halt. This is but one example of the complex challenges that arise for medicines that meet a global need. Companies face an array of conflicting and costly regulatory requirements across the various countries and regions where they would hope to make available a new drug like bedaquiline or delamanid.

Once clinical trials are conducted and a submitted medicine is approved by a stringent regulatory authority, it must then be registered in each of the countries where it will be distributed. For most so-called essential medicines—which WHO publishes as a list, based on the urgent needs of at-risk populations, and with a focus on developing countries—such as those for TB and malaria, companies submit for recommendation by WHO, obtain approval, and then ensure that the medicines are properly incorporated into each target country's national plan to treat key infectious diseases (Lessem et al. 2015).

Finally, when a new medicine is ready for distribution, proper pharmacovigilance—monitoring for and responding to adverse effects caused by medicines—must be in place.[5] This is a

[4] Delamanid has since been approved by the European Medicines Agency.

[5] More fully, pharmacovigilance is the practice of monitoring, assessing, understanding and preventing adverse reactions to medicines once they have been licensed for use and have been distributed into a population. The introduction of new medicines into a market—such as the new MDR-TB medicines bedaquiline and delamanid—should be accompanied by pharmacovigilance activities.

The Need for Strong Regulation of TB Medicines

In TB, given the high risks of creating drug resistance if medicines are misused or are of substandard quality, bureaucracies have been established to carefully manage the distribution of second-line drugs* used to treat multidrug-resistant forms of the disease. The Green Light Committee (GLC), led by the WHO and the global Stop TB Partnership, was established in 2000 to validate national public health programs needing access to second-line medicines. GLC validation was a requirement for programs to receive preferential pricing for medicines, and the committee assured the quality of medicines it procured.

In practice, the GLC was inefficient at approving programs and facilitating distribution, and in 2011 its mandate was revised toward accelerating distribution while maintaining quality assurance (World Health Organization n.d.). Public, national TB control programs in low-income countries also tend toward procuring first-line TB medicines (used to treat typical, drug-susceptible TB) through a centralized mechanism, the Global Drug Facility.

While the international standard for TB control holds that patients should be able to access quality-assured treatment at no cost through public clinics, TB patients do often seek care in the private sector. The most recent analysis of the private market for TB drugs shows that private markets for TB medicines in low-income countries are "substantial, stable and complicated" (Wells et al. 2011). In India, which has the world's largest incidence of TB of any country, enough TB medicines were purchased through private markets in 2009 to treat 117 percent of the India's total estimated incidence. This in a country with a famously robust public TB program.

*These are drugs given to patients that do not respond to first-line treatments, often because they have a resistant strain of a microbe. For TB, they include capreomycin, kanamycin, amikacin, ethionamide, para-aminosalicylic acid, cycloserine, ciprofloxacin, ofloxacin, levofloxacin, clofazimine, and the new medicines bedaquiline and delamanid.

one. In Europe, for example, the estimated total cost of fees to monitor and conduct safety reports could exceed $300,000 per medicine (Milmo 2014). In low-income countries where TB and malaria hit hardest, these costs are prohibitive. And when it comes to TB and malaria medicines,

for all of the reasons I have outlined, the cost for a pharmaceutical company to ensure pharmacovigilance will typically exceed the potential profit gained through the sale of products.

Balancing Access with Quality Assurance and Proper Administration

The majority of pharmaceutical companies operate in accordance with the law and follow good manufacturing practices. But in any industry, there are some bad actors. Robust government regulation is essential to keep these forces at bay and ensure that they do not undermine public health efforts by introducing substandard medicines into the supply chain.

Poor public health infrastructure and inadequate government regulation are likely fueling drug resistance, which can render new treatments ineffective before they even have a chance to work at scale. The *American Journal of Hygiene and Tropical Medicine* is soon publishing a special issue, composed of 17 articles compiled and edited by researchers at the National Institutes of Health (NIH), on the pervasiveness of substandard medicines, with emphasis on HIV/AIDS, TB, and malaria drugs (National Institutes of Health 2015). The NIH researchers found that up to 41 percent of the approximately 17,000 medicines studied failed to meet basic quality standards. Furthermore, in extensive research my colleagues and I have undertaken on malaria medicines, we have found at least 25 manufacturers making substandard versions of

malaria medicines, including more than a dozen making inferior ACTs (Bate, Hess, and Mooney 2010). In far more limited and ongoing research on TB medicines, we found at least five manufacturers (three from India and two from Africa) making inferior first-line TB medicines.

Indirect problems with quality also occur, often encouraged by government attempts to treat people too cheaply. For example, after awarding a tender for its annual supply of the antimalarial artemether-lumefantrine to the lowest bidder, Ajanta Pharma, Kenya experienced wide stockouts in part because of the company's inability to supply the order in full, on time, and with quality medicine (Bate et al. 2012). Other knock-on effects we found as a result of the Kenyan government procurement decision included an expansion of substandard and falsified drugs flooding the market in Kenya and increasing amounts of diverted legal products, which encouraged illegal activity.[6]

As new medicines are discovered and brought to market, it becomes all the more important for governments to take better responsibility for ensuring access while safeguarding drug efficacy. Poor-quality manufacturing, weak supply chains, and improper usage all contribute to malaria and TB drug resistance in low- and middle-income countries and hamper access to safe and effective treatment.

Aside from quality problems with the drugs, clinicians who treat TB often do so improperly. In a 2010 study undertaken in Mumbai, only 6 of 106 physicians asked to write a prescription for TB treatment wrote one for a correct treatment regimen—only 3 of 106 wrote a correct regimen for multidrug-resistant TB (Udwadia, Pinto, and Uplekar 2010). Given this, it is unsurprising that 2010 was the same year that a major Mumbai hospital announced it was treating patients for TB that was resistant to every locally available medicine.

Policy Implications

Public and private actors both have roles to play in ensuring safe, effective access to medicines.

[6] See www.searchingforsafety.net (Media section).

Development

If we want more new medicines, then companies have to be better incentivized to develop them. Some ideas are already in place, and others could be tried, including:

- Companies developing products for emerging-market diseases could get fast-track approval from the FDA for products of their choice in the US (Jarvis 2009).
- Patent extensions on a commercially valuable medicine could be used as a quid pro quo if one develops a product for an emerging-market disease (Bate 2004).
- An advance market commitment (AMC) can incentivize the later stages of development by guaranteeing bulk purchasing of the final commodity once it has been approved. AMCs have the added benefit of creating a market for a new product, thereby helping to move the development of a new commodity outside the realm of philanthropy and into a business model that is more sustainable (Bader 2005). An AMC was successfully used to bring a new pneumococcal vaccines to market and has been deployed globally (Gavi n.d.).
- In return for development financing for companies, donors could push companies to share more compounds from their libraries for drug candidates for diseases they may not want to pursue themselves.
- Companies could voluntarily agree to loosen patent protections on potential products discovered for diseases of poverty to encourage early collaboration with other innovator companies.[7]
- Furthermore, donors could push companies to agree in advance to negotiate with generics producers to voluntarily license their products already in the pipeline. Gilead serves as a good example of how to work in this space.

[7] The Medicines Patent Pool encourages licensing so that patent holders have an effective way to share their innovative products in resource-poor settings and may be compensated by a fair royalty. See http://www.medicinespatentpool.org.

Pricing

Donations provide a benefit to individual patient beneficiaries and can help move discrete quantities of a new medicine into public health systems—but they are an inherently limited and unsustainable approach to improving treatment access for major diseases. Pricing is most efficient and equitable when it is differentiated based on disease burden and, most important, ability to pay in the market. Where the market cannot pay enough, donors must step in to increase access.

One of the reasons Coartem was a success was because Novartis differentiated the market, selling for a profit in the private-sector market and at a breakeven price to governments. When vast purchases are tried (see the AMFm, for example), more producers enter the market to provide supply, and far more access to quality medicines is achieved. However, the clinical outcomes of the AMFm are still to be fully understood, with product diversion and inferior quality never properly assessed.

So far, the malaria community is lucky that resistance development to ACTs like Coartem has not been more rapid. With TB, the world might not be so lucky. Unlike ACTs, which at most take a week to administer, TB treatments last at least six months and, for MDR-TB, approximately two years. The longer the treatment, the greater the likelihood of resistance building. Given the length and high complexity of MDR-TB treatment, in a hypothetical scenario in which MDR-TB medicines were made available for free in high quantities, a corresponding rise in misuse would facilitate increased resistance. Pricing and distribution of TB medicines therefore has to be approached rationally, or resistance may grow even faster.

Regulation

The full spectrum of regulatory hurdles must be reviewed and revised by donors and TB- or malaria-affected national governments to account for current efforts to get medicines to the people in need. The requirement for local clinical trials in India, for example, has needlessly delayed opportunities to get new MDR-TB drugs into the hands of people in need. Furthermore, the costs associated with securing access to new markets—including registration fees; the creation of dossiers to achieve registration status; and the specific scientific requirements, standards, and lengths set for clinical trials—are high and in some cases prohibitive, only discouraging companies from investing in the process.

Some government health departments and international donors are aware of distribution problems, yet while some of their policies aim to combat it, others exacerbate it. We simply must move away from a short-term focus. Treating as many people as possible as cheaply and as quickly as possible can solve immediate problems but create larger and more complex problems in the long term. Rushing the rollout for TB and malaria medicines before the proper systems are in place will only incentivize bad actors and drive drug resistance when people receive incomplete or ineffective treatment regimens. Research published by the TB Alliance has shown that when relatively minor dosing changes have been made to standard TB treatment regimens, public health systems in TB-endemic countries have taken a year to plan for the change and two years to implement it (Wells et al. 2010).

Pharmacovigilance

Historically, advocacy campaigns for access to medicines have lacked a strong pharmacovigilance component—that is, they have predominantly focused on distributing medicines as quickly and cheaply as possible, paying little attention to ensuring the quality of medicines or the integrity of a supply chain. For example, if Janssen increases access to bedaquiline through its donation programs and adverse effects occur to patients, without the proper means to ensure the safety of those medicines, it will likely be held responsible for any negative outcomes.

Poor pharmacovigilance, then, can discourage efforts by the pharmaceutical industry to push for increases in access to the new medicines they produce. Although some health actors privately acknowledge the importance of pharmacovigilance when it comes to TB medicines, it remains to be seen how these concerns will be addressed in practice. Skepticism is warranted because, in one recent case, health activists demanded both delamanid and bedaquiline be given to one drug-resistant TB patient in Los Angeles, even though the products have not yet been approved for use together (Brown 2015).

Policy Considerations

Treating more people who suffer from diseases like TB and malaria is surely a noble goal. But until now, most of the advocacy pressure to improve treatment access has been applied to pharmaceutical companies and international donors. High-disease-burden countries also have a crucial role to play in facilitating access to these lifesaving medicines.

Donors and these nations can achieve sustained success only if they roll out new medicines as part of a systematic plan of treatment that is fully funded. Companies must play their part, but they must not be undercut if success is to be achieved. Ajanta's failing to deliver product in Kenya, India's demanding clinical trials and then preventing them from happening, and health activists' demanding combination treatments for patients that have not been tested properly are just a few examples of the headaches that have arisen, and none of these are the fault of the innovator companies that develop products that can save thousands of lives.

Berating companies that produce new medicines is a losing strategy. Even Bill Gates, a champion of access to medicines for the poorest and financier of some of the major health advocacy initiatives in this space, recently stated unequivocally that high prices are not the problem and that assailing the companies that produce new medicines is counterproductive (Boseley 2015). Furthermore he addresses one of the perverse issues at play when it comes to medicine research—that companies abstaining from research are not criticized, whereas those that actually make products are. "You have some pharma companies that choose never to do medicines for poor countries because they know that this always just becomes a source of criticism," concluded Gates.

WHO is planning to host a consortium to accelerate access to MDR-TB drugs, and the issue will be discussed at this year's World Health Assembly. The entire health community must get behind action to combat infectious disease drug resistance, and part of the solution is establishing sustainable treatment plans. Companies that develop treatments are a small but vital part of that solution. They need to be encouraged to stay engaged and not ostracized, or access to treatment will fail to materialize for those most urgently in need.

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