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Financing Sustainable Drug Development for Neglected Diseases: A Case of Push-Pull Mechanisms and Global Public Goods*

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Abstract: Neglected tropical diseases (NTDs) often afflict the poorest populations of the world. This observation suggests that while demands for new drugs against NTDs continue to grow, there is still a low profit margin for any innovation produced. As a result, there are few incentives for private industrial investments in drugs R&D for neglected diseases, and thus, urgent need for a new set of mechanisms to drive research towards these often "forgotten" issues. One possible solution comes in the form of a collaborative partnership where drugs for neglected disease are seen by public, private and philanthropic organs as global public goods. In this scenario, multilateral collective action creates an artificial market where there are fewer risks for innovators and more results for benefactors. Coupled with policy-based push-pull mechanisms, these collaborations, like the Drugs for Neglected Diseases Initiative (DNDi), mitigate the challenges of a failed market and represents a paradigm for other potential sustainable development collaborations, post-2015.

I INTRODUCTION

Global health has undergone a transformation in the past two decades. New problems arise as old treatment techniques begin to seem ineffective (Tubiana and Jacquet, 2008). At the same time, while the population and income gap in low-to middle-income countries – which account for 92 per cent of the global burden of disease, yet only 16 per cent of global health spending – continue to increase (Moon and Omole, 2013), health care and the pharmaceutical market becomes more and more privatised. As a result, we have seen more and more new drug regulations and bitter disputes over the distribution

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of patented medications in the global South. Furthermore, given that this struggle manifests in the midst of a globalised world, one in which epidemics continue to transcend national boundaries as is the case for many infectious diseases, there is greater need for collaboration between research and policy. Although this realisation suggests that disease treatment and prevention today has become a bigger item on the policy agenda, numerous diseases known as Neglected Tropical Diseases (NTDs) remain overlooked.

NTDs and the conventional pharmaceutics prescribed to treat them are often associated with bacterial resistance, many side-effects including toxicity, long-treatment regimens, complicated protocols, and low availability. Consequently, there is need for modern drugs that are safer, more effective and easier to administer. As diseases most common among the world's poorest populations, highest demand for these drugs and treatments come from people with minimal financial resources, and thus in theory, generates minimal profit potential. Meanwhile, the high cost of research and the high financial risks at stake should a product fail to obtain government approval down the line further discourages industries from paying more attention to drug innovation to treat NTDs.

We thus arrive at a paradox which asks the question, what can the international community do to encourage more sustainable investments and innovation for neglected tropical diseases? In an attempt to address this challenging question, this paper seeks to: (1) examine the social and economic obstacles in drug development for NTDs along with some implications, and (2) explore possible strategies and mechanisms that have been devised in the fight against NTDs. Lessons learned from this process will help address other global health challenges looming on the horizon for the post-2015 agenda.

II EVALUATING NEGLECTED DISEASES TODAY

2.1 *NTDs and the Current Global Health Climate*

Often described as "forgotten," NTDs represent a subset of infectious tropical diseases which are rarely discussed in developed countries until recently due to a lack of prevalence in the North. Typically parasitic or bacterial in origin, NTDs are among the most common diseases afflicting the 2.7 billion people currently living under $2 per day (Hotez *et al*., 2007). They have posed as debilitating health challenges since ancient times, and presently affect about one sixth of the world's population. In regards to locality, the World Health Organisation (WHO) data show that NTDs remain especially endemic in the tropical belts of Africa, Asia and Latin America (WHO, 2011). These are the same countries often classified as "developing"

and with Gini coefficients[1] greater than 0.5 (The World Bank, 2013). In other words, not only do NTDs afflict populations that are impoverished but also those living in areas with high, recurring inequality. For these populations, neglected diseases represent a source of largely avoidable morbidity and mortality; and for their already struggling health systems, an additional preventable (economic) burden.

Figure 1: *Neglected Tropical Diseases (WHO Classification)*

Virus	**Helminth**
Dengue	Cysticercosis/Taeniasis
Rabies	Dracunculiasis
Protozoa	Echinococcosis
Chagas disease	Foodborne trematodiases
Human African trypanosomiasis	Lymphatic filariasis
Leishmaniases	Onchocerciasis
Bacteria	Schistosomiasis
Buruli ulcer	Soil-transmitted helminthiases
Leprosy (Hansen disease)	
Trachoma	
Yaws	

In their first report on the global impact of neglected diseases published in 2010, the WHO cites evidence that the health and quality of life for human populations in 149 countries afflicted by neglected diseases can be continuously improved through implementation of simple and effective interventions, as was done between 2003 and 2010 (WHO, 2011). The follow-up up report published in 2013, re-emphasises this urgency to address NTDs by acknowledging the impressive progress made towards their eradication while stressing a need to adopt stronger strategies currently under development for other infectious diseases (WHO, 2013). This reassurance from the WHO is clear indication that there is momentum driving public interest towards prioritising NTDs as a modern-day global health challenge in the political arena. However, does the research community within pharmaceutical industries share the same sentiments?

[1] A statistical measure of inequality where 0 corresponds to complete equality and 1 corresponds to complete inequality.

2.2 *Drug Development*

Looking at NTDs from the perspective of a drug developer paints a different picture. Without a doubt, the objective for the pharmaceutical industry is to produce drugs and innovate new chemical entities (NCEs) to treat human diseases and disorders. It comes with no surprise that research and development (R&D) consists of a long and costly process. Additionally, once a company manages to develop a product, before the NCE reaches consumers in the market, it must be first approved by a regulatory agency. For example, in the United States, it is the US Food and Drug Administration (FDA), while in Europe, it is the European Medicines Agency (EMA). This final hurdle determines whether or not an NCE is successful, i.e., marketable. Therefore, the premise of subsequent analyses assumes approval rates for NCEs as a representative indicator for progress in R&D of new drugs for a particular category of diseases.

The landmark literature stirring this debate, an independent study conducted by the "Drugs for Neglected Diseases" working group established under Doctors without Borders (MSF) in 2002, identifies a disjunction in drug innovation for NTDs between 1975 and 1999 (Trouiller, Olliaro, *et al*., 2002). Of the 1,393 new chemical entities marketed and approved by various regulatory agencies during that period, only 16 – or about 1 per cent of all drugs developed over the 25-years span – were designed as what can be considered neglected "tropical diseases." Further, of this 16, only 10 or 11 could truly be considered as NCEs. The results suggest a lack of progress during this time period in terms of producing new drugs against NTDs in the years leading toward the end of the 20th century, leading the authors to call this phenomenon a deficiency in the market. An updated study carried out by a separate group using a comparable methodology noted similar trends (Cohen, Dibner and Wilson, 2010).[2] Between 2000 and 2009, despite much greater funding improvements, only 4 or so new products for potential NTD-treatment.

Likewise, a third analysis – a review coming from Brazil, this time using a completely different methodology – narrows down the list to just drugs approved in the United States by the FDA between 2007 and 2011 (de Brito, 2013). Their data shows that out of the 119 NCEs approved for human use in the United States, only five or 4.2 per cent of all drugs approved can be classified as antimicrobial. Of the five, it remains debatable if they can all be used for NTDs. Moreover, the perspective highlighted by this review is interesting because, by honing in on just one country, we see that the American market has been particularly focused on anti-cancer drugs. Unlike

[2] Their paper notes 26, which includes 22 NCEs for HIV/AIDS and Malaria.

NTD NCEs, oncological NCEs make up almost 15 per cent of all new chemical entities approved during the same 5-year period.

The selected literature as well as countless others analysing the same principles all arrive at the same conclusion: NCEs for NTDs is not a priority for the pharmaceutical market, global and domestic.[3] The rate of drug approval for NCEs that either treat or potentially treat NTDs remain low despite the time difference between then and now. Instead, new drugs approved on the market are more likely innovated for non-communicable diseases (NCDs) and disorders more common in high-income countries, like cancer or hypertension. Left alone, the research community within industry shows little interest in innovating drugs for neglected diseases.

2.3 *Funding for Research*

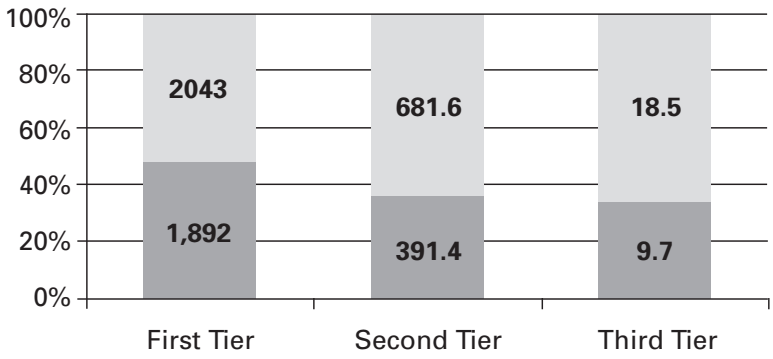
Contrariwise, while new drug development for NTDs is on a decline, investment flows for neglected tropical diseases research appear to be "a rags-to-riches story," according to WHO Director-General Margaret Chan. There have been ongoing commitments by pharmaceutical companies to step up contributions to combat diseases like schistosomiasis by ten-fold (Chan, 2012). Not surprising, other often overlooked diseases like Chagas', dengue, and leishmaniasis have also received more funding in recent years.

Statistical analysis conducted using G-FINDER, a public search tool tracking global funding for innovation for neglected diseases, show that between 2007 and 2011, funding has shifted away from "first tier" diseases such as HIV/AIDS, malaria and tuberculosis to R&D for the "second tier" diseases. It is in this latter category that one would find many infectious diseases including most major NTDs (dengue, diarrhoeal diseases, kinetoplastids, helminthes infections) whose global share of investments has increased from 16.2 per cent to 24.1 per cent. It must be admitted however, that the same data shows certain NTDs belonging to the "third tier" – namely, Buruli ulcers, leprosy, and trachoma – remain poorly funded throughout 2007-2011.

Nevertheless, when considering research for NTDs holistically, global investment in research and development for neglected diseases has increased by approximately $443.7 million USD since 2007 for an overall investment of $3.05 billion USD in 2011 (G-FINDER, 2012). Judging simply by numbers, it is evident that funding for infectious diseases research exhibits a positive trend, with more and more money channelled into research and development for the disease categories cover neglected diseases.

[3] Taking the US market as a proxy for the domestic pharmaceutical market, given its standing as the largest global pharmaceutical market and developer.

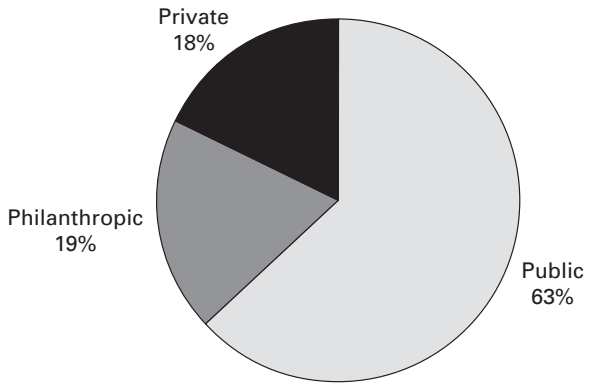
Figure 2: *Investments in Innovation for Neglected Diseases by "Tier" Category of Disease (Expressed as Millions, in 2007 USD)*



2.4 *Funders of Research*

Concurrently, there has also been a shift in types of funders. Although the public sector continues to play an import role, providing the majority of investments towards innovation and product development, the amount of contribution has been decreasing (G-FINDER, 2012). In 2011, only $1.9 billion USD came from the public sector compared to $2.0 billion USD in 2009, as indicated in Figure 3.

Figure 3: *Investments in Innovation for Neglected Diseases by Types of Funders, 2011 (Expressed as Millions, in 2007 USD)*



Likewise, philanthropic funding from organisations such as the Gates Foundation has also declined since the global financial crisis. Conversely, however, private funding (e.g., from multinational corporations or MNCs, excluding philanthropic funds) has risen steadily, almost doubling between 2008 and 2011. Therefore, despite initial fears, the global financial crisis did

not have significant impact on overall funding for research and development for NTDs, given that decreasing investments by the public and philanthropic sectors has been largely offset by private industry funding.

III EXAMINING THE DISCREPANCIES: DRUGS FOR NTDS VERSUS MARKET FAILURES TODAY

Undoubtedly, there is a discrepancy embedded within the current situation. While financial flows towards research and development remain constant, if not increasing, there are far too few new drugs for neglected diseases being approved and introduced into the market. One possible explanation could be that while there may be funding for innovation in NTD research – i.e., the "R" in R&D – there is still a lack in financial resources to support product development – the "D" – once discovery is made.

3.1 *Low-hanging Fruits of the Pharmaceutical Industry*

We can see that public funders direct more funding towards basic research for NTDs in 2011 than in the past (Willyard, 2013). This scenario suggests that perhaps the financial crisis does have additional effects, where new mandates and regulations make basic research more appealing than drug development. Accordingly, perhaps this causes public funding to move towards a comfort zone with lower risks where they fund increasing scientific knowledge behind NTDs rather than producing new NCEs to treat them.

However, this is a claim that has also been refuted, given correlations between basic research and NCE-development down the line. For example, investments by the National Institutes of Health (NIH) in the United States in basic research have statistically significant effects on the entry of new drugs into the market. Applying an econometrics approach, a study by researchers at the US Department of Agriculture (USDA) show that a 1 per cent increase in funding of public basic research is associated with a 1.8 per cent increase in product development (Toole, 2011). This result also implies that research investment and potential market size are both economically and statistically significant determinants of innovation.

By applying this rationale to NCE development for neglected diseases, given the greater funding (i.e., increased investments) and greater calls for new drugs (i.e., increased market demands), then the correlation would imply a potential eruption of NCEs in the near future. Considering that all the low-hanging fruits have been discovered, a brief hiatus and re-focus on basic research would allow time for R&D to acquire the capacity needed to climb higher.

3.2 *A Market Driven for Profit*

Regardless of which position ends up holding more truth, what is clearest in the meantime is that drugs for neglected diseases can be seen as a public-health policy failure. Public policies ensuring that safe, effective and easy-to-administer products are developed and adopted by health systems are lacking, and the drugs produced right now are either unaffordable, inaccessible and not profitable enough to justify their manufacture. Furthermore, research for NTDs historically relies on public funding and investments from donor and development agencies which both share a susceptibility to shocks in the economy. When funding for pharmaceutical R&D shifts towards private entities located in the North, it is not a surprise that NCEs now cater to higher income-generating markets.

In a globalised world, national policies today tend to support a free-market world order, but this preference comes with a catch: actors in the international arena are more profit-driven and financial gains take precedence over global health needs (Trouiller, Torreele *et al*., 2002). Source of funding as the driving factor, seeks to determine the R&D agenda to direct where research should head, while the market which provides the financial incentives to conduct research continues to make all the calls.

3.3 *Private Versus Social Values in the Pharmaceutical Markets*

Evidently, the highest returns for the pharmaceutical sector come from drugs taken life-long for chronic conditions as opposed to medicines that treat acute and parasitic diseases. Drugs for cancer or heart diseases are taken long term, while drugs for infectious diseases are short lived. The latter may bring profit in the short run, but once a patient is cured or if the pathogen is eradicated then there is no longer a need to market such a drug, hence profit plummets. The former is a continuous source of income for industry. In this context, since the consumers of NCEs that address neglected diseases come primarily from low-to-middle income countries, private value like profit, takes precedent over social value, like disease prevention or poverty prevention.

Likewise, the pharmaceutical market currently has a strict regulatory system to ensure quality. Although promoting high standards of care and reducing sales of false medicine is ideal, strict regulation by the agencies in developed countries is a double-edged sword that leaves room for adverse revenue shocks. For example, if a high-profile product is withdrawn from the market – be it a newfound side-effect, resource shortages, etc. – then this could potentially lead to rapid falls in revenues and share prices, not to mention litigation and other inconveniences for the company. In this fashion, pharmaceutical industries tend to stray away from high-risk projects with low-profit margins that have already been "forgotten" in the first place.

3.4 *The Globalisation Backdrop*

Additionally, this market failure could be a consequence of a globalised world, namely, a free rider problem where an innovator bears full costs of any failures that may arise while at the same time unable to profit fully from any success because of imitators free riding on any successful discovery. Ultimately, competition drives prices down closer to marginal production costs, and the original pioneer innovators find themselves less likely to recover initial costs to make ends meet.

At the moment, it is very difficult, if not impossible to apply a global patent on a drug while at the same time keeping sale prices affordable. In the case that a patent is granted to a product, such as the classic solution prescribed by the World Trade Organisation regarding intellectual property, another consequence would arise: monopolies. Distorted market interactions, like monopolies, would drive prices upwards and eventually render drugs for NTDs unaffordable for those who need treatment the most. These shortcomings in the current NTD R&D discussion points to the need for economic and political means to share costs and motivate research.

IV ASSESSING POSSIBLE ALTERNATIVES

According to Nobel laureate Joseph Stiglitz, the health care market is no ordinary market, being one that must rely on people to judge what they should consume, independent of prices (Stiglitz, 2007). Realistically, this might not always be feasible. The grim outlook on health conditions in the South has been attributed to market failures, as stated earlier, and the lack of financial sustainability by low-to-middle income countries. Therefore, it underlines a Southern dependency on developed, higher-income countries in the North to continue providing support for health through official development assistance and foreign aid.

4.1 *The Need for New Incentives*

As a market rifled with distortions is a failed market, policymakers must look for new means of facilitating research and development. For Stiglitz, incentives to counterbalance the profit-driven model for most other products can manifest as a "prize fund" that stimulates research towards less prioritised items that still affect hundreds of millions of people globally. While this is not a panacea for all R&D concerns, it would be useful to redirect declining public resources towards more efficient uses.

The dawn of the 21st Century, however, has also played witness to unprecedented political attention to health challenges of developing countries

through extraordinary growth in both level of international financing and the engagements of new global health actors in the North and South, that has led to striking results (Moon and Omole, 2013). First, the South has begun harnessing a growing presence in the political arena and taking action on life saving, individual-oriented public policy while improving cost-effectiveness. Second, in lieu of nearly-complete reliance on public-sector funding from national ministries of health operating through the WHO and other bilateral and UN-agencies, these traditional actors of the 1980s and 1990s are now joined by a variety of non-governmental and civil society organisations, private industries, and philanthropists. Can discourse between new actors be exploited by the international community to create strategies that address the NTD challenge?

4.2 *A Horizontal-Vertical Interface*

In spite of paradoxical data, there is still hope for the future. Government has a tendency to channel aid horizontally, as a hands-off approach to aid delivery and placing greater responsibility on local partners. This approach assumes that the recipients have the capacity to manage and deliver services, because governance at the local level is more suited to address local needs. However, in the case of NTDs and NCEs, since drug development and R&D typically takes place in the North, it is unlikely for the South to be able to use this development assistance for health to address the NTD challenge. Vertical programmes, on the other hand, focus on strategising, monitoring and evaluation, and implementation in one particular field, like a specific disease or category of diseases. They are frequently found in combating epidemics in poverty-stricken areas with poor infrastructures and poor institutions, as seen with GAVI or the Global Fund.

However, rather than looking at health development programmes as vertical versus horizontal, perhaps we should consider a vertical-horizontal interface as an alternative for setting clearer goals. Some tasks, like strategising and monitoring are best kept vertically, while others, like service delivery and quality care, horizontally. If this were to be the solution, then part of development assistance for health could go towards multi-lateral coordination where vertical and horizontal programmes work in parallel rather than in opposition. As such, multilateral partnerships consisting of academic institutes, philanthropic organisations, governments and private industries have emerged to form product development collaborations with well-defined goals. These public private partnerships (PPP) work together to mitigate the challenges of a failed market for drugs for neglected diseases by employing a public-good strategy.

4.3 *Public Private Partnerships in Health: The DNDi Model*

Product development collaborations through PPPs may potentially fulfil a counterbalancing role against market failures by creating an artificial "push" mechanism to encourage investments which are then "pulled" along by financial commitments of public and philanthropic funds (Mueller-Langer, 2013). This push-pull strategy supplies both the resources that drive research forward and the promise of remuneration and great success that draws further investments. As collaboration between private and public sectors, PPPs share the cost and risk between private industries which have the technology and resources to carry out the R&D project and the public entities and foundations that have the will to finance and foster the project.

One recent realisation of such model is the Drugs for Neglected Diseases initiative (DNDi). This programme, which aims at implementing a sustainable mechanism to correct the lack of a profitable market and promote mechanisms that relate to public health policy of and financing for drug innovation. It therefore, represents a model that offsets the previously outlined market imperfections. A collaboration between seven organisations from around the world,[4] DNDi finances research and development up front and offers the results of its drug discovery process on a non-exclusive basis to generic producers, thus allowing any chemical entities created through the initiative to be available at low costs (Chatelain and Ioset, 2011). The pooling of resources by global health partners provided the needed impetus to incentivise pharmaceutical industries, leading to relative success for NTDs.

Data from G-FINDER shows that the bulk of funding for DNDi, comes from public aid agencies such as the UK Department for International Development (DFID) and the French Development Agency (AFD) but also private philanthropic entities like the Bill and Melinda Gates Foundation. It represents a good example of a frontloading mechanism to accrue long-term sustainable funding commitments from donors, because certain non-governmental entities have the ability to formulate and maintain funding mechanisms and agreements that are more difficult for public donors to organise. In short, teaming up and working through these partners ensures long-term funding.

Furthermore, as a needs-driven initiative, DNDi has first-hand knowledge of needs via the organisation that make up the initiative. It is able to take this information and match it up with opportunities in research and development,

[4] The Indian Council for Medical Research (ICMR), the Kenya Medical Research Institute (KEMRI), the Malaysian Ministry of Health, the Oswaldo Cruz Foundation in Brazil, Médecins Sans Frontieres (MSF), the Institut Pasteur in France, and the Special Programme for Research and Training in Tropical Diseases (TDR)

and push the most relevant, most important projects through the pipeline to ultimately reach a specific target (Pecoul, 2004). At the same time, involvement by governments from the North also comes with research and technical capacity, indicated by the NIH or European Commission Research Directorate in the G-FINDER data. Thus, government aid channelled through an implementing partner like DNDi enable the PPP to finance global health programmes like R&D for NCEs to treat NTDs while ensuring financial stability in the long run. There is thus this image of the push and pull mechanism outlined earlier to address a deficient market.

4.4 *Drugs for Neglected Diseases as Global Public Goods*

Consequently, the artificial market created through support from the public in the form of global health partnerships is founded on the basis that drugs for neglected diseases and their research and development are global public goods (Moon, Bermudez and Hoen, 2012). The medical knowledge produced benefits for not just one particular country or population but rather the entire global community. It is non-rival in the sense that disclosing such knowledge does not reduce the amount available for others to utilise. It is non-excludable by reasoning that no person can be excluded from benefitting from or being affected by the public good. Once an NTD is eliminated, no person could be excluded from the associated benefits, which in this case is a healthier world.

In short, DNDi considers itself the best medium or multilateral multi-donor support because it streamlines the entire research and development process through a mediating role. It standardises the PPP relationship and assures some form of quality and impact evaluation. While multilateral aid agencies provide funding, the private sector provides the technology and industry. By funding product development projects, governments – such as the UK through DFID and its other organisations like TB Alliance and TDR – show real commitment to its policy to make global health a priority, thus fulfilling goals set during the G8 in 2005. As a result, global health collective action brings donors, managers, scientists and implementers all to the same table in a joint collaboration between public and private sectors. Through these collaborative environments, the pharmaceutical market can be properly incentivised to motivate private providers to contribute their technology and expertise and continue on a trajectory on which they otherwise would have not.

V DISCUSSION: NTDS, DRUG R&D, AND THE POST-2015 SUSTAINABLE DEVELOPMENT AGENDA

With the 2015 deadline looming on the horizon for the Millennium Development Goals (MDGs), debates today revolve around how a financing structure should look when it comes to health and how to ensure more sustainability in development. Meanwhile, government donors are met with pressure to cut development assistance across all sectors. Few among OECD countries are able to meet the recommended 0.7 per cent GNI aid spending target as official aid (of which 0.1 per cent is allotted to health). For developing countries, this translate into serious concerns about meeting goals set in the health MDGs by 2015, and for the rest of the world, this paints a picture of unfocused and incoherent action. Ultimately, these hindrances leave greatest repercussions on the poorest of the poor where NTDs run most rampant.

While this paper focuses on NTDs, this category of high burden diseases can serve as a proxy for other maladies faced by people in low-to-middle income countries. Examining the issue from a social epidemiology perspective, we can categorise this problem as not just a medical challenge but a socio-political one for development, by correlating social conditions and political decisions to the patterns of diseases, morbidity and mortality.

NTDs are associated with poverty but poverty itself is not necessarily attributable to the least developed countries. At the same time, we have seen the widest inequality gaps surfacing in emerging economies and middle-income countries. Consequently, lifestyle diseases, cancer and other NCDs also emerge, but gain precedent over ailments that affect only the poor. We thus arrive at a "vicious cycle" where NTDs continue to be neglected – burdening those who cannot afford to be sick and throwing those communities back into a state of poverty – while NCDs receive more attention thanks to their higher profit potential.

Thus to correct for these challenges post-2015, we must look at the world as described by economist Paul Krugman, where it is nonsense for countries to compete with each other in the same sense that corporations do (Krugman, 1994). In drug innovation, designing a compensating policy is tricky because mutualising and aggregating gains and sharing losses are not enough. Thus, development targets aimed to reduce poverty must address health challenges like NTDs directly, but also other issues that are determinants of health like social inequality, which has taken a higher profile after the economic crisis. Development aid should target not only low-income countries but also low-income populations. When promoting health and equality, it is not enough to focus *within* states; rather, targets must also address the situation *between* states through partnerships and global collaboration that push and pull development issues through.

All in all, while the data show a grim picture with an increasing burden of diseases, and increasing market failures resulting in insufficient drug development for NTDs, this scene also comes with increasing trends in development assistance through the entry of new donors and partnerships. Since economic landscapes and disease demographics constantly change, development assistance for health and innovation, post-2015, should likewise evolve to better handle the growing sustainable development issues. New funding schemes facilitated by PPPs will ensure consistency in funding and sustainability in the long run, and cooperation between public and private donors ensure the right technical needs. Improved coordination will help align donor objectives with national/regional health priorities – including NTDs – in addition to creating dialogue space for stakeholders and willingness to produce more global public goods.

VI CONCLUDING REMARKS

The lack of new chemical entities for treating neglected diseases over the last 30 years is due to market failures; any progress in the field is not market driven. However, there have been signs of improvement coming from partnerships originating outside of the private sector but still dependent on them in one way or another. Development aid – including financial support for health – is moving away from the traditional binary model of donor-recipient and direct transfer of goods towards multilateral collaboration. Through this model, international organisations, public and private, pursue a goal and end up providing a high-quality, reliable product as public goods.

In the case of NTDs, progress manifests through better sharing and implementation of technical, medical information through the Drugs for Neglected Diseases initiative. An economic incentive is required to draw private industry towards addressing the needs of developing countries which then must be followed up with a reduction in the costs and risks to the industry manufacturing or delivering the product. Global health partnerships significantly rely on contribution and cooperation, and, therefore, some sort of collective action from both private and public partners. Ultimately, such relationship will lead to an artificial market with the right pushes and pulls, capable of stimulating innovation for often forgotten issues.

REFERENCES

CHAN, M. 2012. *Best Days for Public Health are Ahead of Us, Says WHO Director-General* (May 21).

CHATELAIN, E. and J.-R. IOSET, 2011. "Drug Discovery and Development for Neglected Diseases: The DNDi Model", *Drug Design, Development, and Therapy*, pp. 175-181.

COHEN, J., M. S. DIBNER and A. WILSON, 2010. "Development of and Access to Products for Neglected Diseases", *PLoS ONE.*

DE BRITO, M. A., 2013. "Investment in Drugs for Neglected Diseases: A Portrait of the Last Five Years", *Revista da Sociedade Brasileira de Medicina Tropical*, pp. 1-2.

G-FINDER, 2012. *G-Finder Highlights 2012,* London: Policy Cures.

HOTEZ, P., D. MOLYNEUX, A. FENWICK, J. KUMARESAN, S. SACHS, J. SACHS and L. SAVIOLI, 2007. "Control of Neglected Tropical Diseases", *The New England Journal of Medicine*, pp. 1018-1027.

KRUGMAN, P., 1994. "Competitiveness: A Dangerous Obsession", *Foreign Affairs.*

MOON, S. and O. OMOLE, 2013. *Development Assistance for Health: Critiques and Proposals for Change,* London: Chatham House.

MOON, S., J. BERMUDEZ and E. T HOEN, 2012. "Innovation and Access to Medicines for Neglected Populations: Could a Treaty Address a Broken Pharmaceutical R&D System?", *PLOS Medicine.*

MUELLER-LANGER, F., 2013. "Neglected Infectious Diseases: Are Push and Pull Incentive Mechanisms Suitable for Promoting Drug Development Research?", *Health Economics, Policy, and Law*, pp. 185-208.

PECOUL, B., 2004. "New Drugs for Neglected Diseases: From Pipeline to Patients." *PLOS Medicine.*

STIGLITZ, J., 2007. "Prizes, Not Patents", *Project Syndicate.*

THE WORLD BANK GROUP. 2013. *GINI Index.* http://data.worldbank.org/indicator/SI.POV.GINI.

TOOLE, A., 2011. "The Impact of Public Basic Research on Industrial Innovation: Evidence from the Pharmaceutical Industry", *Research Policy*, (Elsevier), pp. 1-12.

TROUILLER, P., E. TORREELE, P. OLLIARO, N. WHITE, S. FOSTER, D. WIRTH, and B. PECOUL, 2002. "Drugs for Neglected Diseases: A Failure of the Market and a Public Health Failure?" *Tropical Medicine & International Health*, pp. 945-951.

TROUILLER, P., P. OLLIARO, E. TORREELE, J. ORBINSKI, R. LAING and N. FORD, 2002. "Drug Development for Neglected Diseases: A Deficient Market and a Public Health Policy Failure", *The Lancet*, pp. 2188-2194.

TUBIANA, L. and P. JACQUET, 2008. "La Fin Des Maladies Negligees?", *Regards sur la terre.*

WORLD HEALTH ORGANISATION, 2013. *Sustaining the Drive to Overcome the Global Impact of Neglected Tropical Diseases,* Geneva: World Health Organisation.

WORLD HEALTH ORGANISATION, 2010. *Working to Overcome the Global Impact of Neglected Tropical Diseases,* Geneva: World Health Organisation.

WILLYARD, C., 2013. "Neglected Diseases See Few New Drugs Despite Upped Investment", *Nature*, pp. 1096-1098.