



Innovation for neglected tropical diseases – patent vs. Alternatives to patent

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Abstract

Neglected tropical diseases (NTDs) are a group of 20 parasitic and bacterial infections that primarily affect the world's poorest and most marginalized populations. Patents are legal protections granted to inventors, giving them the exclusive right to manufacture, use, and sell their inventions for a certain period. While patents can provide financial incentives for inventors to develop new treatments for NTDs, they can also create barriers to access and affordability, particularly in low-income countries where the burden of NTDs is highest. Developing innovative treatments for NTDs is essential, but the question of whether to patent or pursue alternative strategies is complex and controversial. Alternatives to patents, such as prizes, tax policies, research grants, financial instruments etc. are gaining popularity as a means of promoting innovation while ensuring affordability and accessibility of treatments for NTDs. Ultimately, the choice between patenting and alternative strategies depends on the specific circumstances and priorities of each case. Overall, both patented and non-patented approaches can contribute to innovation for NTDs. However, it is essential to strike a balance between promoting innovation and ensuring accessibility and affordability for those who need it most. In some cases, patenting may be the best option to incentivize investment in R&D, while in others, alternative strategies may be more effective in promoting innovation while ensuring access to essential medicines for those in need. A balanced approach that considers both innovation and access to medicines is crucial in the fight against NTDs.

Keywords: Patents, innovation, neglected tropical diseases, alternatives to patent

Introduction

The rate of innovation in a perfect market would be very low is a largely agreed concept. This might be due to multitude of features of such market like free entry and exit, lack of product differentiation and firms having perfect access to the same technology. Under such situations if the innovators are not amply incentivised, they would be at a disadvantage. Hence, some kinds of incentives are required in order to push the resources into innovation activities. Intellectual Property Rights are one such incentive and in the case of pharmaceuticals it is patent.

Patents are commonly used as an incentive for pharmaceutical research and development because they provide a legal mechanism for protecting the investment made by the companies in developing new drugs. Patents grant the patent holder the exclusive right to make, use, and sell the invention for a certain period of time, typically 20 years from the date of filing.

For pharmaceutical companies, patents are particularly important because drug development is a long and expensive process that can take over a decade and cost billions of dollars. Without the ability to protect their investment through patents, companies would have little incentive to develop new drugs, as competitors could simply copy their innovations and sell them at a lower price without having to bear the costs of research and development.

Patents also provide an important source of revenue for pharmaceutical companies. By being able to charge high prices for their patented drugs, companies can recoup the costs of research and development and make a profit, which they can then use to fund future drug development.

However, the use of patents in the pharmaceutical industry is not without controversy. Critics argue that patents allow

companies to charge exorbitant prices for life-saving drugs, making them unaffordable for many patients. Additionally, some argue that the 20-year patent period is too long, and that it limits competition and stifles innovation.

Overall, while patents can provide a powerful incentive for pharmaceutical research and development, policymakers must balance the benefits of patent protection against the need to ensure access to affordable medicines for all patients.

The pioneer studies on patents and appropriability ^[1] shows that patents were an important means of profit from innovation in pharmaceutical industry. But on the other hand, a study by Scherer and Weisburst ^[2] in Italy in 1982 found that there is no clear effect of patents on pharmaceutical R&D. When it comes to the Indian scenario, a study ^[3] conducted soon after the implementation of TRIPS Agreement by Lanjouw and Cockburn surveyed some managers of Indian pharma companies which highlighted that patent protection did have some impact on the R&D spending of such companies. It is now obvious that patents do affect the R&D expenditure in the pharmaceutical industry, but the rate of impact is yet unknown.

A firm's interest in investing in drugs and therapeutics for a disease is profoundly influenced by the market. If such market is economically or epidemiologically too small then the firm's interest in investing in such market may be mired leaving the issue barren. In such cases even the availability of patent protection will not act as sufficient incentive. One such issue is the case of Neglected Tropical Diseases.

NTDs are a varied set of 20 illnesses that are primarily seen in tropical regions. They primarily impact underdeveloped societies and disproportionately harm women and children

[4]. Such diseases have an overwhelming effect on health, social and economic conditions on the citizens of developing and least developed tropical countries who are already burdened with poverty, malnutrition, etc. Diseases are said to be neglected when they are mostly overlooked by the pharma companies despite its high incidence rate. Such diseases generally affect the world's poor and hence historically have not got much attention in comparison to other diseases. NTDs have a negative impact on physical and cognitive development, cause disease and mortality in mothers and children, make it difficult to work in agriculture or earn a livelihood, and reduce productivity at work [5].

Cancer on the other hand is one of the most researched diseases in the world. The reason for that might be that it affects both the rich and the poor alike and hence there is a market with buying capacity. To reach this conclusion a comparison as to the global incidence of both cancer and NTDs and the number patents granted/ filed for those diseases can be done.

Cancer vs. NTD
Global incidence

Comparing the global incidence and patent status of NTD and Cancer during the period of 2005 to 2015 it is quite evident that not much research is done in the field of NTD when compared to that of cancer. The most common types of cancers in the year 2020 were [6]:

- Breast cancer (2.26 million cases);
- Lung cancer (2.21 million cases);
- Colon and rectum cancer (1.93 million cases);
- Prostate cancer (1.41 million cases);

The below table provides the global incidence of various cancers during the period 2005 – 2015. The global incidence of the above-mentioned types of cancers are

- **Breast cancer:** 7,27,831
- **Lung, tracheal and bronchus cancer:** 4,51,419
- **Colon and Rectum cancer:** 4,41,857
- **Prostate cancer:** 6,43,899

Global incidence of Cancer during the period 2005 to 2015

Cancer	Incident Cases, No	
	Year 2005	Year 2015
Breast cancer	1693867	2421698
Lung, tracheal and bronchus cancer	1567203	2018622
Colon and Rectum cancer	1211619	1653476
Prostate cancer	974188	1618087

[7]

On the other hand, the NTDs which has the greatest number of patent families which means that they are the most researched out of all other NTDs. The global incidence of such NTDs during the period 2005 – 2015 are

- **Dengue:** 86,257,710 [8]
- **Leishmaniasis:** 10,51,824 [9]
- **Leprosy:** 57,405 [10]

Number of patents

Number of granted and filed patents in the year 2005 – 2015 of the above listed types of cancer are [11]

- **Breast Cancer:** 1,842
- **Lung, tracheal and bronchus cancer:** 1,430

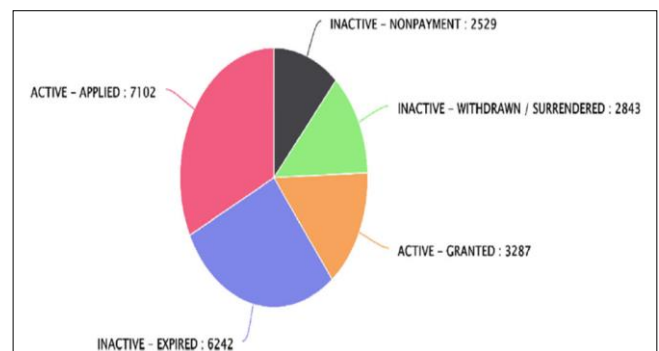
- **Colon and Rectum Cancer:** 1,434
- **Prostate Cancer:** 936

Number of granted and filed patents in the year 2005 – 2015 of the above listed types of cancer are [12]

- **Dengue:** 300
- **Leishmaniasis:** 52
- **Leprosy:** 24

The below figure portrays the status of the patent families of NTDs and it is self-explanatory that almost half of it are inactive and only 14.9% is active granted patents. This makes us question the amount of research that actually goes into NTDs.

Current legal status of patent families of NTDs



[13]

Out of total 850 new therapeutic products approved during 2000 – 11, only 37 (4%) were for NTDs whereas 103 (12%) were for cancer, which is 3 times that of NTDs [14]. This demonstrates that, while accounting for around 10% of the worldwide illness burden, NTD has experienced little therapeutic advancement in recent years. The number of patents filed/granted for NTDs is vastly disproportionate to the number of persons affected by the condition. It is evident from the global incidence and number of patents that the ratio of the same is way higher in the case of cancer in comparison to that of Neglected Tropical Diseases. As already mentioned, the global incidence of dengue is 8,62,57,710 which is 8,55,29,879 more than that of breast cancer; yet the percentage is 0.25 for cancer and 0.0003 for dengue. A similar trend can be seen for the rest of the diseases as well. Setting patent as a factor to determine the amount of research going into a particular disease, it can be concluded that regardless of the burden inflicted by the NTDs, not much research is happening to find solutions for it. By offering incentives, intellectual property plays a crucial part in encouraging R&D. It assures inventors that they will get compensation for their innovations through temporary market exclusivity. This also applies to the pharmaceutical industry. The incentive system, however, has not been able to encourage R&D expenditures for diseases that primarily impact countries with a high frequency of neglected diseases. Out of the 256 therapeutics that reached the market during 2012 -2018, only 8 were for NTDs, that is, 3.1%. out of the 157 small-molecule compounds, only 2 new chemical entities, that is, 1.3% were approved for neglected diseases [15].

It has to be accepted that patent does have a huge impact on innovation in the economy but even with patent when innovation is not being spurred in the field of NTDs it

clearly indicates that patent might be a failure and there is a need to look at other alternatives to bring about innovation here. That's not saying that there is no innovation whatsoever in this field, but the question is, is it enough?

Reasons For The Gap In R&D

It has been determined that NTDs lack proper research, which raises the question as to what causes the lack of R & D.

IPRs, and in the case of pharmaceuticals, patents, are crucial for promoting innovation the importance of which cannot be overlooked. If it is not adequately protected, naturally, other pharma companies will exploit the knowledge from the newly innovated drugs to create a cheaper biosimilar that is less expensive. When the drugs reach the market the latter one will be preferred by most consumers due to the lower price. The competitors here invested almost nothing when compared to the original innovators. The lack of ample IP protection also raises the issue of free riding. For the innovators who invested their time and money into developing the drugs this would demotivate them from further such investments. The investors remain motivated if their investments are safeguarded and if they benefit out of it.

The anticipated returns depend on multiple factors like the R&D costs, the policies that might affect both the supply and demand of the said drugs etc. These are the factors that the pharmaceutical companies consider in deciding which drug to pursue. The anticipated returns is directly proportional to the investment into the R&D [16].

The pharmaceutical industry is considered the most research-intensive industry [17]. The cost to develop and win marketing approval for a new drug is \$2.6 Billion [18]. This number may not be accurate. It is a common practice for companies to give out false digits as their expenses. There are arguments that many pharma companies charge their products not according to the expenses they have incurred but on whatever the market will bear. Even though the exact expense of drug development and the cost of drugs are questionable, there is no argument that when compared to other industries, a much higher cost and time is invested for drug development. This is a major reason that the pharma companies state as to why they tend to focus on those diseases that can give them the most returns, that is, "blockbuster drugs". Often times, pharmaceutical corporations only spend as much on NTDs as they spend on the marketing and advertising of their most successful products.

The pharma companies target those markets which are large and stable with buying capacity who are willing to pay high prices. For example, in the United States in 2011, the most lucrative drugs were for heart disease and depression [19].

Now the question is, there is patent and hence monopoly, if a company actually invents a drug for NTD, still there is not much happening there; why?

"IP systems work in deliberate and unavoidable reliance on the market mechanism, which exhibits a predictable bias for intellectual goods that generate the most appropriable value in consumer markets. As a result, various socially desirable intellectual goods—basic research, drugs for diseases in small markets, well-reasoned political dialogue, and 'fair and balanced' news reporting, to name just a few—remain

underproduced even with intellectual property regimes in place [20]."

IPRs do in fact rectify market failures by safeguarding investors, but this only occurs under specific economic circumstances. That is, the patent system doesn't incentivize the public health goods which have a social value if it doesn't have a monetary value. Investments in scientific research that have the potential to result in private advantages are preferred by rational economic decision-making [21]. If a medicine benefits thousands of people it is still significantly less alluring and attractive, as is the situation with neglected tropical diseases due to the low purchasing capacity. By this point, it should be obvious that the profitable sectors will receive the majority of attention rather than addressing the more urgent need of the hour. For eg, around 2010 annually more money was channelled into treatments for male pattern baldness (\$2billion) as compared to malaria (\$547million) [22]. This was because balding men could afford their medical care more than the malaria patients in the developing and least developed countries. This is the 10/90 gap wherein 10% of the global health research expense is invested in diseases that trouble 90% of the world's population.

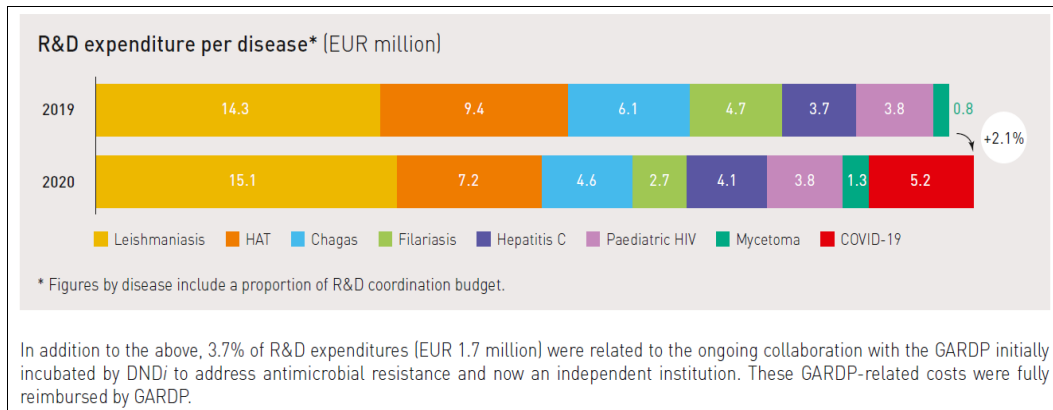
Patients in underdeveloped nations make up the biggest group of patients who are not included in the potential advantages of biomedical research [23]. Exclusion starts from the very step when the area to be worked is chosen by the pharmaceutical companies. As rightly pointed out by Joseph E Stiglitz (2006) 'Poor people cannot afford drugs, and drug companies make investments that yield the highest returns [24]. It is quite evident at this stage that NTDs are not neglected because of the number of global incidences. These diseases in fact distresses millions of people but the central issue is that the affected population are so deprived that they don't have the capability to exert any kind of pressure for better legislative measures or to attract investment into such research. Sympathetic concerns about such unfortunate population doesn't have any power over how the world economy operates. "Deadweight loss" is the economic term for this set of customers who have a need for a product but just cannot afford it [25].

One topic that is frequently discussed that results from the monopolistic power provided by patents is access to medication. In the case of NTDs, access to medicines comes in second place since there are no appropriate drugs available in the first place.

HIV/AIDS crisis is an apt example for the access to medicine. The disease initially predominantly affected the poor people of developing and least developed countries but later on during the 1980s the crisis started to spread throughout the US as well. This spread spurred widespread fear and hence resulted in a research boom in the area. The economics side of the issue is that a global pandemic yield more profit than an epidemic which is only present in the developing and least developing nations with not much buying capacity.

With this it is safe to say that the lack of ample research into diseases like NTDs is because of the lack of market. Patent does have a significant role in innovation for NTDs if it is effective in increasing the market size. PR alone has not been able to meet the medical and health demands of the world's impoverished.

Impact Of Covid-19 On Ntd R&D



[26]

There is a clear decrease in the R&D expenditure of DNDi for certain NTDs like Chagas, HAT etc in the year 2020 when compared to 2019. This suggests that COVID – 19 had an impact on the research and development of NTDs when focus was shifted to the global pandemic.

All economic sectors have been impacted by COVID 19, which has resulted in poverty, unemployment, and several other problems. Also, it has had a substantial effect on crucial health services. The epidemic has mostly captured medical professionals' attention, leaving the neglected diseases even more neglected.

Alternatives

The current patent system as a means of incentivising R&D has left multiple public health challenges unresolved and promoting stringent patent protection alone might not do the job of spurring innovation in certain areas. Pharmaceutical R&D's existing patent-based incentive paradigm is ineffective at tackling public health challenges, particularly in developing nations [27]. The stronger the monopoly, the greater is the ability to charge high prices [28]. Patent alternatives may come in handy to overcome these issues. Alternatives can be broadly divided under two heads – push mechanism and pull mechanism.

Push Mechanism

Push mechanisms as the name suggests pushes innovation by paying for the research's efforts by financing the cost of the research. Research grants, tax policies, Product Development Partnerships, financial instruments etc are some examples of push mechanisms.

It is unlikely that these tools will encourage research that satisfies the needs of developing and least developed nations, as the main problem there is a lack of a market with purchasing power. In such conditions, those alternatives that create market prospects might be better.

Pull Mechanism

Pull incentives on the other hand pays for the actual result. It focuses more on the later stages of a research than on the early stages. The pull mechanism encourages the innovators to select those projects which are the most promising. The most discussed pull mechanism is the prize system wherein prize is awarded to those innovators who produces a result according the terms and conditions of the project.

1. Research Grants

One of the earliest and most popular methods for fostering innovation is through grants. Research organisations receive grants in order to finance the future researches so as arrive at a predetermined conclusion. Grants are considered as the seed money to help kickstart – not sustain – innovation [29]. Research's first stages are typically covered through grants. Research funds are often provided to those individuals or institutions who are deemed to be sufficiently competent and qualified, such grants specify the various terms and conditions to be fulfilled as well. The amount of research grants differs according to the organisations and the projects. Grants have the disadvantage that the grantor has little influence over how the grantee utilises the fund provided to them once they are released.

Bill and Melinda Gates Foundation is a private entity which provides research grants to multiple organisations. The Coalition for Operational Research on Neglected Tropical Diseases (COR-NTD) through the research grants from the Bill and Melinda Gates Foundation and the US Agency for International Development, provides funding and technical assistance on individual operational research studies aimed at optimizing preventive chemotherapy programs for many NTDs [30]. The African Research Network for Neglected Tropical Diseases (ARNTD) along with the Coalition for Operational Research on Neglected Tropical Disease (COR-NTD) via their African Researchers' Small Grants Program (SPG VI), provided research grants to nine recipients to enable them to innovate to combat NTDs [31].

2. Financial instruments and program-related investments

Equity stakes, loans, guarantees etc are some of the financial instruments that are used as an alternative to funding. It is also known as “program-related investments” (PRI). PRIs are made by organisations to fulfil their philanthropic goals. PRIs bring in both public and private funding, by improving the cash flow, access to capital etc strengthens the organisations' capacity. The more enticing a programme is more PRIs it draws in. PRIs get benefit from special tax provision in the US [32].

In comparison to other alternatives like grants, there is a better relationship between the investor and the investee in the case of PRIs. In terms of the investee's decisions, the investors have greater wiggle room, that is flexibility and validating power. One of the major disadvantages of PRIs is that it is dependent on how appealing the programme is. For

example, the Gates Foundation which is considered to be one of the largest PRI investors, has committed around \$1.5 billion to fund PRIs^[33]. The foundation made a PRI in a Nairobi-based for-profit startup, M-KOPA which sells solar lighting and mobile phone charging systems. The foundation also provided a grant to help in the expansion into new geographic areas^[34].

Tax Policies

Tax policies can be legislated in such a way so as to encourage R&D investments. When compared to other alternatives tax policies are more flexible as they leave the gap to the firms to choose where they want to invest.

For example

1. **Vaccines Research Relief scheme:** it was introduced in the UK in 2002 that allowed companies an additional 50% of eligible expenditures from their taxable income for the research and development they did on vaccines or drugs for diseases like malaria, HIV/AIDS and tuberculosis. The relief is applicable only to those expenditures incurred on or before April 1st 2017^[35]. The relief was not a huge hit, which implies that it did not have a noteworthy impact on a company's research decisions^[36].
2. **Patent Box:** the rate of corporation tax that is levied on the income generated from some forms of qualifying IP is reduced using patent box policies. Unlike many other alternatives that target the initial phases of R&D, patent box policies mainly aim at the final stages that is, commercialisation^[37].

Tax Credits

Under the tax credit policy, the taxpayers are allowed to reduce a specific amount from the tax they owe. Tax credits lowers the actual tax that is payable, on the other hand tax deductions reduces the amount of taxable income. The administrative cost required to implement tax credit system is much lesser when compared to other alternatives. The system is not conditional on the achievement of any result in order get the tax benefit. One of the major disadvantages of the tax credit system is that it uses public fund and it depends on the political interest.

Prize

The prize system is wherein a return which covers their cost of production is given to an innovator for their innovation^[38]. Financial rewards are given to individuals and organisations if they achieve a set of pre-determined goals. The innovator will have to fulfil certain conditions like making the medicine so innovated affordable, open licensing of the IP rights of such medicine, performance of the product, overall improvement of health in comparison with the existing treatment etc. which may vary according to the project in order to get the prize. Prizes can be used to push research in such areas which are less explored. One of the major disadvantages of the prize system is that there is no assurance the prize amount might cover the cost of development of the product. In such cases it doesn't act as an incentive.

The types of prizes are

- **One-off (Sui generis) Prizes:** One of prizes are used for limited purposes where the conditions to acquire the prize is specific.
- **Prize Fund:** Prize funds are made for single prizes and the fund can be divided among various organisations where the prize for various products determined according to its merits.
- **End Product Prize:** In end product prizes the reward is given when an end goal is achieved and if such end goal is actually useful. This makes sure that the risk of unwanted expense is less.
- **Interim Prizes:** Different from the end product prizes, in interim prizes, the reward is given for such innovations that might lead to an end product and not to the actual end product. When compare to end product prizes, interim prizes are less expensive. The major disadvantage is that interim prizes need not always lead to useful products unlike end product prizes.
- **Open-Source Dividend Prizes:** Open-Source Dividend Prizes are given to those organisations or individuals that shares their know how, knowledge etc openly. Such sharing might help other organisations to make use of the knowledge and know-how and innovate further which leads to faster innovations.

Example: The American Leprosy Missions in partnership with Novartis awarded \$40,000 to finalists in two domains - Dr. Amber Barton and Dr. Martin Holland (Data and analytics finalists, London School of Hygiene and Tropical Medicine) and Dr. Temitope Agbana (Diagnostics finalist, Delft University of Technology) in 2021 for the application of AI tools to classify participants into clinical categories and predict their likelihood of developing scarring and blindness due to trachoma and for the digit diagnostic tool for schistosomiasis diagnosis respectively^[39].

3. Advance Market/Purchase Commitments (AMCs)

Advance Market/Purchase Commitments or AMCs as the very name suggests is where the donor or the investee makes a purchase commitment in advance, to finance the purchase of the product on pre-determined conditions and prize when they are developed^[40].

The AMC helps the innovators in tackling the distortions in the vaccine market which is unpredictable^[41]. In order to push the innovators to research in certain areas, it is important for them to know that there is a stable and reliable market for their product. Such a market can be mimicked using AMCs.

Example: Under the Advance Purchase Commitment, Gavi has provided US\$ 5 million dollars aimed at aiding Merck with taking its Ebola vaccine through approval and WHO prequalification, even as international epidemic focus has shifted to the Zika virus^[42].

4. Priority Review Vouchers (PRV)

Priority Review Vouchers or PRVs are provided as a reward for innovating new products. Such vouchers are regulatory

vouchers which can be used to get a priority review for another product at hand. By using the Priority Review Vouchers the time duration required to get approval for a drug can be reduced to approximately four months. The voucher can also be transferred wherein it can be transferred for lumpsum amounts.

The advantage of such vouchers is that it doesn't require any additional cost as there is already a voucher holder fee. A major disadvantage is that, like many other alternative mechanisms, PRVs also depend on the political will. PRVs can help in reducing the approval time but there is no assurance that the drug will reach the market approval stage.

5. Product Development Partnerships (PDPs)

Product development partnerships are virtual coordinators which acts as a mediator between various public and private institutions and individual innovators. They are non-profit organisations which brings together organisations and individuals from various fields to work together in achieving a common goal like innovation and affordable treatment in certain diseases. PDPs get their funds from various donors which they allocate to various projects under them and they coordinate their partners' activities in completing these projects.

Examples

- a. **Medicines for Malaria Venture:** It is a PDP with headquarters in Geneva that was founded in 1999 with support from the World Bank, the Rockefeller Foundation, and the governments of Switzerland, the United Kingdom, and the Netherlands. The organisation along with its partners have brought forward about 12 antimalarial medicines since its establishment^[43].
- b. **Drugs for Neglected Diseases initiative (DNDi):** the organisation was established in 2003 by Médecins sans Frontières (MSF), Oswaldo Cruz Foundation, Indian Council for Medical Research (ICMR), Kenyan Medical Research Institute (KEMRI), Ministry of Health of Malaysia, and Institut Pasteur, with WHO-TDR (a Special Programme for Research and Training in Tropical Diseases of the World Health Organization) as a special observer^[44]. The organisation works for innovating drugs and vaccines for neglected tropical diseases.
- c. **Global Alliance for TB Drug Development:** The mission of the non-profit organisation TB Alliance is to find, develop, and provide better, quicker-acting, and more accessible tuberculosis medications to people who need them. Incorporated in 2000, the Global Alliance for TB Drug Development (TB Alliance) brings together business, non-governmental organisations (NGOs), governments, foundations, and more than 30 partners globally. The TB Alliance works to hasten the discovery and development of new anti-TB drugs that are affordable and effective, which should shorten or simplify treatment, offer a more effective treatment for multidrug-resistant TB, and enhance treatment for latent TB infection. The TB Alliance draws on the best practises and resources of the public and private sectors to do this^[45].

d. International AIDS Vaccine Initiative (IAVI):

Established in 1996 its goal is to convert scientific findings into widely available, reasonably priced public health solutions. To hasten the creation of secure and efficient AIDS vaccines for use globally, the International AIDS Vaccine Initiative (IAVI) was founded in 1996. IAVI partnerships and activities are based in the areas of the globe with the highest disease burden, and we place a strong emphasis on sustainability^[46].

Conclusion

No patent grants its owner any pecuniary right straight away. The right the patent holder has is to sue those who infringe his patents, which individual innovators rarely since patent lawsuits are so expensive. An innovation becomes worth something only when a capitalist takes it up to the market, but in doing so the capitalist demands the majority share of the profit and in most cases, the reward is received not by the innovators but by the capitalists.

Patents can be a double-edged sword. While they provide legal protection, they can also create barriers to innovation by stifling competition and limiting access to new technologies and ideas. In some cases, patents may be used as a tool for litigation, leading to costly legal battles that can impede innovation.

Overall, patents and innovation are closely intertwined, with patents playing a critical role in promoting innovation by incentivizing inventors to invest in research and development. Patents can be an important tool for promoting innovation, but they are not the only means of protecting and promoting innovative ideas.

Neglected tropical diseases are not neglected by the pharmaceuticals or research institutes because of the lack of a market. The size of its market moderately big. The issue here is the buying capacity of such market. It affects the people of tropical and developing countries due to its unique reasons. Patent which almost always acts to promote innovation fails to do it in this arena. Patent is not enough to spur innovation in NTDs as studies suggest. So, this leads us to look for various alternatives to maybe honey trap and pull pharma companies into doing research in this area. NTDs cannot be neglected for much longer. There is a question of human rights and the economic development of the country involved. When the Covid – 19 pandemic hits, the already made progress in NTD area itself declined. Now, a much stronger participation from various governments, research institutes, pharma companies and philanthropists are required for fulfilling NTD goals. Thus, there is no single alternative that can bring about the required level of innovation.

In conclusion, while patents can play a role in promoting innovation and the development of new treatments for neglected tropical diseases, there are also concerns about access to affordable medicines. Hence, a hybrid mode of alternatives and patent system can be tried.

Out of the available alternatives research grants seem to be one which pushes innovation into neglected areas but it alone will not be sufficient enough. The advantages of various alternatives are to be looked into and such merits are to be implemented into the domestic patent regime to complement it.

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