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Approaches for Controlling Neglected Tropical Diseases: A Case Study Grounded in Public Health Policy

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Abstract: Neglected Tropical Diseases (NTDs) comprise a group of twenty pathogens which primarily affect the global poor. Despite their significant public health impact and relative ease of prevention, NTDs frequently receive limited attention and funding compared to other diseases. In this paper, I first identify the relevant context and issues that NTDs cause in affected individuals and communities, including issues in existing non-policy approaches to treat NTDs. I explain how NTDs often cause stigmatization from communities that often prevent patients from seeking medical care. Then, I describe current health policy regarding NTDs and argue that they are insufficient primarily due to inadequacies in political systems, funding, infrastructure, and healthcare delivery. Lastly, I propose health policy in the form of health education, the use of community drug distributors (CDDs) in healthcare delivery, drawing on our experience with past pandemics to design health policy, and the establishment of incentives to involve pharmaceutical firms in the research and production of medicine to cure NTDs.

Keywords: Neglected tropical diseases, Vector-borne diseases, Vector control, Health policy, Community drug distributors.

1. Introduction

Neglected Tropical Diseases (NTDs) comprise a diverse group of twenty parasitic, fungal, viral, and bacterial infections which primarily affect the global poor [1]. They are found in environments which are characterized by poverty and other inequalities in access to health services, housing, safe water, and sanitation [2]. Globally, NTDs kill 200,000 people, take nineteen million disability adjusted life years (DALYs), and cost developing communities billions of US dollars annually in "direct health costs, loss of productivity and reduced socioeconomic and educational attainment" (data from un.org). While NTDs affect over 1 billion people and cause 1.6 billion to require both preventative and curative intervention measures, these diseases have historically rarely appeared on the global health agenda (data from unitingtocombatntds.org).

The purpose of this paper is to identify public health policy proposals that can be used to better treat NTDs. To accomplish this, I conduct a literature review to contextualize the issues, both medical and societal, that NTDs currently cause, and evaluate our current policy approaches to alleviating their impact. Based off this evaluation, I then propose public health policy that can be used to ameliorate the public health crisis caused by NTDs.

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2. NTDs in Status Quo

The majority of NTDs are vector-borne, meaning they are transmitted to humans by living organisms that can transmit infectious pathogens between humans, or from animals to humans- most commonly being bloodsucking arthropods [3].

While wealthier nations with modernized healthcare systems possess high standards of sanitation, technologies, and medicine that have effectively eradicated NTDs- which are often preventable with proper sanitation- within their borders, poorer nations lack the resources and infrastructure to do so [4]. For example, drugs used to treat NTDs, readily available in developed countries, are often in short supply or prohibitively expensive in affected communities where the average person lives on "less than US$2 a day." (data from sdghelpdesk.unescap.org). Although proven and cost-effective vector control methods such as "long-lasting insecticidal nets, larvicides, molluscicides and environmental management" exist, the remoteness of specific communities in developing nations may hinder the distribution and maintenance of insect nets and larvicides [5]. However, vector control methods may be problematic for reasons independent to capacity or funding- pesticides used to control insect vectors to prevent diseases such as dengue fever, malaria, or Lyme disease have been linked to numerous cancers alongside chronic and neurodegenerative diseases.

As such, NTDs typically strike in remote communities in developing countries who cannot afford preventative healthcare. Their remoteness contributes to the lack of attention NTDs receive from the media and aid agencies; while their relative poverty means that the financial incentive for private companies to provide pharmaceutical treatments to these regions is low.

Moreover, while most NTDs are not necessarily lethal, they often cause disfigurements in patients which face heavy stigma and discrimination from local communities- greatly impacting their mental health and discouraging victims from seeking medical treatment [6]. This leads to an underreporting of cases and distorts the true extent of the crisis. In Nepal, patients often resisted health-seeking behavior and treatment for leprosy at hospitals, favoring instead traditional health practitioners, for fear of stigmatization and ostracization; in Thailand, "55% of community members believed that staying in a community with leprosy-affected persons was a shame or embarrassment".

This stigmatization manifests into many concrete and significant social and economic impacts, such as long-term disability, poverty, and unemployment [7]. Stigmatization similarly leads patients into self-destructive behaviors such as substance abuse or self-harm as a means of coping; or into a self-perpetuating vicious cycle- as individuals with NTDs are at high risk for mental health conditions, and individuals with mental conditions are at a higher risk of an NTD. To fully treat NTDs, we must also address the psychological harms they bring to communities.

While there have been successful past and current efforts to control the continued spread of such diseases, - for example, the CDC's guinea worm eradication program, which reduced the number of guinea work cases from 3.5 million to 100 between 1980-2024, or the WHO's five-pronged public health strategic interventions, an increase in funding and attention to this issue is clearly required to treat the one billion patients who continue to be affected by NTDs.

An effective tool to treat any pandemic is a unified and coordinated public health policy. However, there remain several political obstacles to passing legislation that would give aid to those who need it most. Wealthier countries lack incentive to export healthcare and medication to poorer nations. Domestic issues generally take precedence over those of another nation and will attract more fiscal spending and public discourse. Since NTDs are not a public health priority- or problem- in the countries which do have resources to develop them, funding for such projects is a low priority. Even when vector control programs are included in a wealthy nation's foreign aid strategy, they must often compete with other issues in the target country. Medical aid can be sidelined in the face of economic or political instability, for example. In addition, Healthcare programs are long-term by nature; they

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take time to see significant change. A politician with four years to influence policy has an incentive to fund programs likely to see success in their time and nation. Citizens would be likely to vote for effective public policy with tangible benefit to themselves, as opposed to a distant community.

Many affected regions lack the funding to implement adequate health and sanitation infrastructure to treat and prevent NTDs, this, coupled with the low levels of media and corporate attention NTDs have received, shows that a passive increase in funding over time is unlikely; instead, policy action is required to mobilize this funding [8]. One of the pre-requisites to preventative healthcare is proper public health surveillance- the systematic collection, analysis, and use of health-related data to improve public health and prevent disease- which many developing nations lack or experience difficulty with [9].

Significant funding gaps exacerbate our inability to develop advanced medical infrastructure that is the pre-requisite to treating NTDs. The London Declaration on Neglected Tropical Diseases, a collaborative effort launched in 2012 where political leaders, pharmaceutical companies, and NGOs committed to work together to control ten NTDs by 2020 projected a funding gap of approximately $300 million USD per year within its first annual report (data from https://doi.org/10.1186/s40249-018-0444-1). NTDs are also underfunded comparative to other diseases relative to their burden- while research on the group of 20 pathogens that comprise NTDs totaled $100 million in the United States in 2016, research on just 3 pathogens with a similar burden- HIV, malaria, and tuberculosis- was 15 times that amount, at $1.5 billion. There have been recent advances in funding, however, with global donors pledging $777 million to fight neglected tropical diseases in the COP28 in December 2023 (data from gatesfoundation). It is also important to note that traditional, one-time grant models may be unlikely to work, as their short-term nature is antithetical to the continuous and significant sources of funding that the long-term production of drugs targeting NTDs would intuitively require.

Aside from this, the delivery of medical care must be done in a way that does not spark provider-patient distrust or negative sentiments; or, in other words, presented and integrated in a way that is acceptable to local communities who are often tight-knit or remote. In 2003, local imams in the Nigerian province of Kano organized a boycott over the polio vaccine which spread to five other provinces in the country, claiming the vaccine was part of a “U.S. plot to spread AIDS or infertility in the Islamic world” [10]. A large outbreak of polio followed. Patients must first trust and establish connections to healthcare providers for care to be delivered.

3. Methods of Strengthening Public Health Policy

Increased international awareness leading to political will and funding would naturally help with some of these challenges highlighted above. To address a malady on public health as large as those of NTDs, significant amounts of international co-operation is likely to be required through existing or novel organizations, in the form of sharing medical information, coordination of research and treatment efforts, and international funding and investment; similar to what we observed in the global response to the 2009 H1N1 outbreak [11].

3.1. Health Education

Another aspect of NTDs that is just as important to correct is the stigma they inflict on affected individuals. Many NTDs, if left untreated, cause serious physical disfigurements over time [12]. Consequently, affected individuals become prone to isolation and stigmatization from their communities, creating a burden on their mental health and quality of life. More perniciously, stigmatization often causes patients to avoid seeking or staying with medical treatments [13]. The tool of public health policy could mitigate this stigma in two ways- first, through the establishment/improvement of existing health education programs in schools to dispel myths and

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misconceptions about NTDs that drive stigma, and by attempting to convince patients to consult a doctor. In addition, an increased amount of centralization and control over healthcare systems is required- in order to construct rapid responses to NTD outbreaks or to coordinate treatment plans to remote communities, health surveillance and centralized healthcare systems that are able to co-operate interdepartmentally and act on information will be necessary.

3.2. Community Drug Distributors

The delivery of healthcare with regards to treating NTDs must be improved. Traditional methods of healthcare delivery are often infeasible to NTD patients in remote and hard-to-reach communities (in sub-Saharan Africa where NTDs are endemic, 1 in 8 people live more than an hour away from the nearest health center, while 90% do not access health insurance). In addition, there may be a lack of trust towards healthcare providers foreign to their communities and traditions. To mitigate this issue, it might be useful instead to outsource and decentralize the delivery of healthcare to local representatives in communities affected by NTDs, through a system of Community Drug Distributors (CDDs). A CDD is a volunteer health worker from the community who receives training in the distribution of drugs among their community- some of their responsibilities include keeping a drug inventory, liaising with health workers, and determining the quantity of drugs required [14]. CDDs also help educate the community on prevention of these diseases. The primary use of CDDs would be to bypass the pre-existing distrust between foreign medical practitioners and local communities. In Ghana, where mass drug administration was carried out through the use of CDDs, community members had generally positive perceptions of the impact of drug distribution through CDDs; in Uganda, “increased perceptions of risks associated with onchocerciasis infection” caused by CDDs led to high treatment compliance. However, it is important to note that community perceptions of the reliability and credibility of CDDs are also influential in the “uptake of NTD activities” .

3.3. Corporate Incentives and Public-private Partnerships

Public health policy amounts to nothing without the producers of medicine. Currently, the economic incentives of pharmaceutical firms naturally de-prioritize the need of those who suffer from NTDs who are unable to pay for expensive anti-parasitics. Pharmaceutical firms regularly spend tens of billions of dollars annually on R&D for new drugs, and companies are willing to risk this capital in part due the prospect of potentially monopolizing the market for a new treatment (data from brookings.edu). They therefore deprioritize the manufacturing and distribution of research and development into drugs for NTDs due to the lack of profitable markets in impoverished regions18. Nonetheless, under considerable international pressure, select pharmaceutical corporations have pledged medical aid in the past- with “extraordinary global health advances” being reported; showing that pharmaceutical firms have the capacity to treat NTDs when incentivized.

However, NTD programs may also be seen as bad investments. Countries who suffer from NTDs are often located in regions who are developing economically or grasping at political stability [15]. One NTD, leishmaniasis, often “thrives in conflict” zones, where breakdowns in health infrastructure, destruction of human habitats, and food insecurity increase susceptibility to the disease [16]. As such, pharmaceutical corporations and governments would be averse to invest in unstable or fractured political regimes.

An appealing model to address these issues could be the use of public-private partnerships (PPP) for the research and development of drugs. In this context, a PPP is a collaborative, legally binding agreement in which government entities, international research centers, NGOs, and private firms collaborate by “sharing and distributing resources, knowledge, risks, and benefits” [17]. PPPs are

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helpful in overcoming the profit incentive that discourages pharmaceutical companies from entering the markets in which NTDs are endemic while also meeting governmental targets to treat NTDs [18].

A type of PPP that may be especially helpful is the one used by the Drugs for Neglected Diseases Initiative (DNDi). The DNDi -a non-profit- uses a model in which they bring together "200 partners around the world" in "the public, private, academic, non-profit, and philanthropic sectors" to "leverage the unique expertise of each partner to drive innovation for neglected populations." (data from dndi.org). DNDi co-ordinates interactions between the providers of funding, governments, and pharmaceutical corporations to fund the research and development of drugs targeting NTDs.

More importantly, to keep the costs of drugs for patients low, the DNDi uses a de-linkage model in which the licenses on the intellectual property generated from the research partnership "secure DNDi's right to have the final product distributed and sold in all endemic countries on an affordable and equitable basis."; the DNDi then negotiates the long-term manufacture and distribution of the product at the lowest possible price in endemic countries; thus de-linking the cost of research and development from the finalized price of the product for patients [19].

This model has seen considerable success; since 2003, the DNDi has developed two new chemical entities to treat African sleeping sickness and hepatitis C and develop "10 new treatments from existing molecules and recombining drugs to bring better treatments to patients for malaria, Chagas disease, leishmaniasis, HIV-visceral leishmaniasis co-infection, and paediatric HIV" (data from dndi.org).

4. Conclusion

In conclusion, the goal of this paper was to propose health policy that could be used to combat and treat NTDs. To accomplish this, I conducted a literature review regarding the stigmatization and damage NTDs cause to communities and our current policy approaches to tackling them.

It is important to understand the limitations of my policy proposals. Firstly, the rectification of stigma caused by NTDs must be publicly funded by wealthier governments with diverse political agendas who may not prioritize NTD research over other, more immediate diseases or political causes. While they are meant to break the distrust traditionally given to foreign medical professionals, the effectiveness of CDDs is often dependent on their own trust and credibility within their own communities, and even with significant funding, medical research may require long periods of time to yield fruitful results. In addition, widespread health surveillance may intuitively be infeasible in developing countries, even with foreign aid.

As the actual production and development of drugs is of the utmost importance in the treatment of NTDs, in the future, more research- specifically on the effectiveness of financial incentives and other tools that can be used to incentivize the development of drugs by pharmaceutical corporations- must be conducted by government agencies who can grant funding and co-operate with corporations to create those drugs.

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