

# An Analysis of Neglected Tropical Disease Research after a Decade of World Health Organization Action

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## Abstract

For decades, Neglected Tropical Diseases (NTDs) have persisted among the poorest global populations, creating a significant burden on already fragile healthcare systems. The World Health Organization (WHO) recognizes the complex impact that these diseases have on the well-being of individuals in many low-income countries (LICs) and thus renewed its efforts in 2007 to garner global support for eliminating NTDs. However, an important question is how this action has shaped NTD research. This scoping review aims to describe if and how NTD research has evolved between 2010 and 2020 to identify gaps in the field that should be addressed to bring the diseases closer to elimination. It examines articles from the OVID global health database published in 2010, 2015 and 2020 to identify trends in the focus (etiological, intervention, or policy) and geographic location (low-, middle-, or high-income countries) of NTD research. The results identify two key gaps in NTD research that have not been addressed since global health action began in 2007: an underrepresentation of first authors affiliated with low- and middle-income countries, and a relative lack of policy-focused research. Thus, we recommend that global health actors improve NTD elimination efforts by increasing policy-focused research and encouraging low-income country authorship.

## Introduction

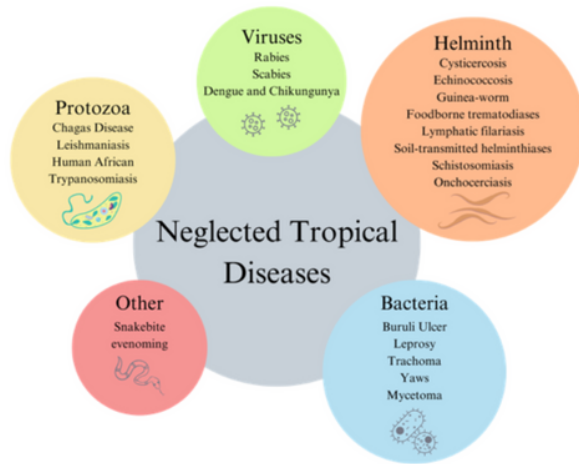
Neglected tropical diseases (NTDs) are a class of diseases that affect the “bottom billion”, the poorest one-seventh of the global population [1-4]. There are roughly forty NTDs identified worldwide [5]. The World Health Organization (WHO) focuses on 20 of the most pervasive ones, listed in Figure 1 [5]. NTDs are not linked by their pathology, but instead share a common social and geographic distribution [6,7]. They affect individuals in low socioeconomic conditions with limited access to education, clean water, sanitation, and health care; and they are concentrated in tropical climates [5]. NTDs can also cause chronic disabling conditions [2-5,7-9]. In 2010,

the Global Burden of Disease study found that all NTDs accounted for 27 million disability-adjusted life years lost [10,11]. This value is greater than those estimated for malaria or tuberculosis (TB), two diseases that have received far more attention from the global health community [4].

Despite their pervasiveness and devastating burden on fragile healthcare systems, NTDs have been neglected from global health discourse for decades [4]. Experts attribute this neglect to the disproportionate attention to human immunodeficiency virus (HIV), malaria and TB [12], and to the inequitable access to healthcare in NTD endemic regions [3,4,13].

In 2007, the WHO and other global health actors began taking action to reduce the prevalence and burden of NTDs. They have released two global action plans and four comprehensive reports that have elevated efforts to combat NTDs and increased donations from pharmaceutical companies and non-governmental organizations (NGOs) [6]. Notably, in 2016, the UN recognized NTDs for elimination in the third Sustainable Development Goal (SDG), marking one of the first times that global targets were set to combat NTDs [14].

Given these efforts, we conduct a scoping review to examine if and how global health research has evolved to better address the root causes of NTDs' pervasiveness.



**Figure 1:** List of Neglected Tropical Diseases Based on Their Causative Agent

**Methodology**

We searched the literature using the Ovid Global Health database as its focus on communicable, tropical, and parasitic diseases as well as community and public health research [15] aligns with our study aims. We considered articles published between 2010 and 2020 using the search term “Neglected Tropical Diseases”, and we focused on abstracts. Changes in NTD research would be

expected after earnest global efforts began in 2007. We did not consider articles published after 2020 given the likely impact of COVID-19 drawing attention away from NTDs.

Due to time constraints, we only considered articles published in 2010, 2015, and 2020 to identify trends. Two independent reviewers applied the inclusion and exclusion criteria (Table 1) to the title and abstract.

**Table 1:** Inclusion and exclusion criteria for title and abstract article review

Include	Research published in all countries
	Primary and review articles
	English publications
Exclude	Articles on NTDs generally, on one or more NTDs, or on treatment options/intervention plans
	WHO reports, letters to the editor, pre-print works
	Non-English publications
	Articles focused on Malaria, HIV/AIDs, Tuberculosis, or other non-NTD communicable diseases

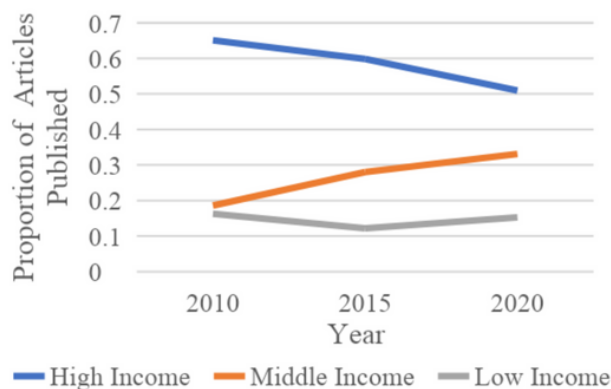
One reviewer extracted data for all articles and the second reviewer extracted data for every tenth article to check accuracy. The extracted data items include: the focus of the research (etiological, policy, or intervention), the type of research article (primary or review), the publication year (2010, 2015, or 2020), the NTD(s) studied, the country of the first author’s research institute, and the paper’s country of focus (if any). Etiological research explores the causes of disease; policy research examines access to interventions, distribution programs, local understanding of NTDs, and global efforts to combat NTDs; and intervention research focuses on current and potential therapeutics. All data extraction was conducted using Covidence software.

## Results

The literature search returned 340 articles for the years 2010 (48 articles), 2015 (118 articles), and 2020 (174 articles) combined. During the title and abstract review, 33 papers were excluded because they did not meet the eligibility criteria.

A key finding was that there continues to be an underrepresentation of LIC first authors in NTD research. Figure 2 shows that LIC first authors consistently made up the smallest proportion of all authors studying NTDs. The proportions of first authors from LICs, middle-income countries (MICs), and high-income countries (HICs) in the three years were not significantly different ( $\chi^2=4.98$ , d.f.=4,  $p=0.30$ ).

However, Table 2 shows that more than half of the first authors are from HICs, even though only a small fraction ( $10/145 = 7\%$ ) of the research has an HIC as the country of focus (when specified). Where the country of focus is not identified, two-thirds ( $110/162$ ) of first authors are from high-income countries.



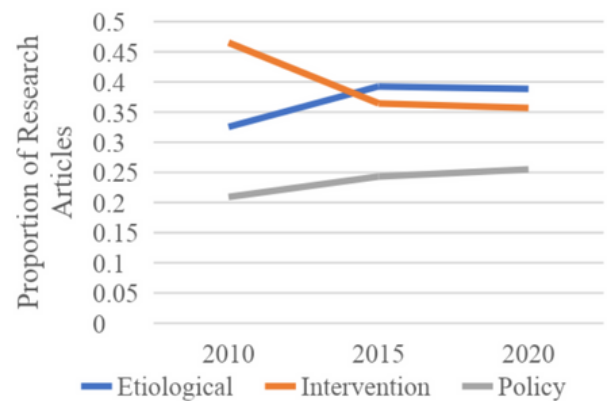
**Figure 2:** Proportion of NTD research first authors' country affiliation by year.

**Table 2:** Comparison of study's first author country affiliation to the study's country of focus

First Author Country	Country of focus				Totals
	Low-income	Middle-income	High-income	Unspecified	
Low-income	34	0	0	11	45
Middle-income	2	47	0	41	90
High-income	27	25	10	110	172
Totals	63	72	10	162	307

*Note.* If an NTD research paper was focusing on a specific country, the country was recorded and then further classified into low-, middle-, or high-income. If the NTD paper did not specify a country of focus (COF), usually these papers were studying the properties of a medication or the disease, and they were marked as unspecified.

Another notable result is the consistent paucity of policy-focused research from 2010 to 2020. Figure 3 shows that the proportion remains low at roughly 25% of all NTD research and the proportions of etiological, intervention, and policy-focused research across the three years did not change significantly ( $\chi^2=1.80$ , d.f.=4,  $p=0.77$ ).



**Figure 3:** Proportion of NTD research focus by year.

## Discussion

The results in Figure 2 and Table 2 reflect the colonial themes that continue to underlie NTD research. HIC actors dominate global health academic authorship, particularly in the field of

health equity [16], leading to the underrepresentation of LIC first authors in NTD research. This creates the false narrative that HIC actors are more capable of understanding health inequalities and how to address them and reduces the capacity of those in LICs to act [16]. While donations from HICs, NGOs, and pharmaceutical companies have been instrumental in bringing NTDs towards elimination [17], it is important to consider the input of LICs when combatting these diseases. HIC authors must remain “active research peer[s]” [16] in the field of NTD research, by mandating equitable collaboration between HIC and LIC authors [18]. Furthermore, when different groups of authors do collaborate, HIC researchers disproportionately benefit by receiving greater funding, administrative support, and opportunities to present their findings and continue researching, which is often at the expense of LIC authors [18].

NTDs are complex diseases that are affected by poverty, access to healthcare, sanitation, and education [4,7]. Policy-focused research is essential to understanding how these factors influence NTDs and to structuring treatment plans so that they address these complex needs [4]. For instance, many individuals affected by NTDs live in remote regions outside the reach of any healthcare system or treatment plan [4,19]. Policy-based research can guide the restructuring of treatment distribution programs and access to interventions to reach a broader population [20]. Additionally, current treatment options have been found to cause severe side effects or lose their efficacy over time [21]. Etiological- and intervention-focused research will be important for providing new ways to combat NTDs [4]; however, without any supporting policy-focused research (as is currently seen in Figure 3), treatments will remain inaccessible to many NTD-affected populations.

## Conclusion

NTDs have persisted in the most impoverished regions of society for centuries. They are often caused by viruses, bacteria, helminth, and protozoa, but remain pervasive due to a complex network of social and geographic factors that perpetuate a cycle of poverty. Recent global efforts spearheaded by the WHO have begun to renew global solidarity towards addressing NTDs and increase attention to these diseases. This review examines how NTD research has changed since 2010 and identifies gaps that must be addressed by the global health research community. Global health actors must encourage LIC researchers to lead projects given their essential perspective on NTDs and how to address them. Additionally, policy-focused research must continue to supplement etiological and intervention-focused research on NTDs to ensure benefits will accrue to all communities affected by NTDs.

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