# An Analysis of the Failure of the World Health Organization's 70% COVID-19 Vaccination Goal in Developing African Countries using Actor Network Theory Framework

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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## Introduction

In 2021, the World Health Organization (WHO) declared a target of 40% Covid-19 vaccination coverage by the end of 2021 and 70% coverage by mid-2022 (World Health Organization, 2022). However, by June 2022, only 18% of people were fully vaccinated in Africa even though 60% of people were vaccinated globally (Mathieu et al., 2020). Additionally, only 23% of people in Africa received at least 1 COVID-19 vaccine dose by June 2022 (Mathieu et al., 2020). This vaccination rate is significantly lower compared to countries with higher incomes compared to developing African countries, like the United States, United Kingdom, France, and Spain, which had single dose vaccination rates above 80% (Mathieu et al., 2020). Besides the capital differences, the lack of infrastructure in African countries has been a driving force behind insufficient COVID-19 vaccine distribution. The main infrastructure issue revolves around production and supply chain barriers in African developing countries. Currently, Africa imports approximately 99% of vaccines administered due to a lack of manufacturing capacity and there are currently no complete COVID-19 manufacturing chains in Africa (Asundi et al., 2021). This makes developing countries very reliant on developed countries, where the drug substance part of the vaccine is produced. Since the COVID-19 vaccines rely on new mRNA technology that was discovered in developed countries and patented by Pfizer and Moderna, access to COVID-19 vaccine manufacturing knowledge and cold storage infrastructure in developing countries adds additional barriers for them to produce and distribute their vaccines (Asundi et al., 2021). If only production capacity is considered responsible for insufficient COVID-19 vaccine distribution, then the actors contributing to capital, infrastructure, and manufacturing differences and along with the issue of vaccine inequity will not be understood.

In this paper, I will argue that the network around global COVID-19 vaccine distribution failed in the interessment and enrollment stages of translation, causing the overall network to underperform and, therefore, resulted in inequitable distribution for developing African countries. Through examining WHO's published guidelines, the "Strategy to Achieve 70% Global Covid-19 Vaccination by mid 2022, and vaccination rates in developing African countries, specifically WHO's failure to meet the 40% and 70% COVID-19 vaccination goal in the region by the end of 2021 and the middle of 2022, respectively, I will use Actor Network Theory (ANT) to illustrate that WHO, high coverage countries (HCCs), and pharmaceutical companies were the actors responsible for the COVID-19 vaccination network to fail during interessment and enrollment, causing the network to underperform. ANT is a framework that describes how network builders assemble heterogeneous networks composed of human and non-human actors in order to address a problem (Darryl Cressman, 2009). First, using ANT, I will lay out the central human and non-human actors involved in the COVID-19 vaccination network. Using the network and the failure of WHO's vaccination goal, I will then show how the network failed during interessment and enrollment because WHO failed to effectively recruit and assign roles to other actors. Then, I will show how HCCs and pharmaceutical companies also contributed to the enrollment stage failing due to the actors not accepting and executing their roles. HCCs failed to donate vaccines during network formation because of vaccine hoarding due to nationalism. Pharmaceutical companies, specifically the mRNA COVID-19 producers Pfizer and Moderna, failed in their role due to the prioritization of profit over health by refusing to share technology and opposing proposals to waive intellectual property rights on Covid vaccines.

**Literature Review**

Since the development of the Covid-19 vaccine, many other scholars have discussed the inequitable Covid-19 vaccine distribution due to a large disparity in doses administered between wealthier countries and developing countries. Starting on a broad level, Bayati et al. provide a systematic review of the distribution of the Covid-19 vaccine from December 2020 to May 2022. The review found that the macro determinants of inequality in the Covid-19 vaccine distribution were consistent with a country's economic status, infrastructure, health system, legal and politics, epidemiologic factors, and demographic factors (Bayati et al., 2022). While their paper offered determinants on Covid-19 vaccine inequality, it failed to include any studies from Africa. Additionally, the article failed to examine the relationships between countries and actors in the vaccine distribution field.

More in line with my claim in this paper, Emrah Altindis of Boston College observed that inequitable distribution of Covid-19 vaccines was due to various socio technical issues, and even went as far to say that vaccine distribution is "prolonging the pandemic" (Altindis, 2022). In contrast to the review above, Altindis argues that the issues of intellectual property rights, lack of public funding in developing countries, and how COVAX lacked useful solutions for logistical problems each contributed to the inequitable distribution of vaccines. Unfortunately, Altindis failed to consider the impact of WHO, HCCs, and pharmaceutical companies on the network. In this paper, I will use the influence shared across these works of scholarship and directly elaborate on the critiques on COVAX,  funding, infrastructure, and the role of wealthy countries in Covid-19 vaccine distribution. I will use actor network theory (ANT) to provide a more thorough and systematic analysis of the failure of the World Health Organization's goal to vaccinate 70% of people in developing sub saharan African countries.

**ANT Framework**

My analysis will employ the science, technology, and society concept of ANT,which gives an effective framework for examining the sociotechnical issues surrounding vaccine inequity during the COVID-19 pandemic. ANT is an effective framework because it allows me to isolate and critique heterogeneous network components. ANT is commonly associated with three writers: Michael Callon, Bruno Latour, and John Law (Darryl Cressman, 2009). ANT is the idea that network builders assemble heterogeneous networks composed of human and non-human actors in order to accomplish a goal or solve a problem (Darryl Cressman, 2009). Therefore, ANT is useful when performing critical analysis of the formation and function of complex sociotechnical systems because of the ability to isolate different human and non-human actors. Within ANT, the framework focuses on the relationships between actors and how actors influence each other's behavior. Therefore, in ANT, an actor's power is based on the strength of relationships with other actors rather than the actor's individual strength. While focusing on relationships is key to defining actor-network relationships, the development and progression of a network can be analyzed using Callon's concept of translation (Darryl Cressman, 2009).

Translation refers to the process of forming and maintaining an actor-network. The process includes the following overlapping steps: problematization, interessement, enrollment, mobilization, and black-box. In problematization, a primary actor, the builder, defines the problem the network must address, identifies the necessary actors needed to solve it, and sets an obligatory passage point (OPP) through which the other actors must pass to form a stable and mutually beneficial network. In interessement, the primary actor attempts to recruit the other actors into the network by attempting to separate them from other networks. Also, during interessement the primary actor tries to align the interests of other actors with the problem and

OPP originally defined by the primary actor. In enrolment, the other actors are allocated roles and positions within the network by the primary actor. Enrolment demands that the other actors in the network actually accept and faithfully carry out their assigned roles as intended. In mobilization, the primary actor attempts to secure its role as the director and spokesperson for the actor-network, which begins to function as a cohesive whole. Finally, black-box is where the network formation is successful by functioning as a stable entity. Callon also illustrates how an actor-network defined in such a way can fracture or fail if one or more of the actors refuses or is unable to perform the role assigned to it by the primary actor (Darryl Cressman, 2009). I will use ANT to illustrate that within the sociotechnical network of Covid-19 vaccine distribution to developing countries, HCC, like the United States, have become a rogue actor which is destabilizing the network. I will further use ANT to discuss the strength of connections between WHO, COVAX, production infrastructure, distribution infrastructure and funding, and regulatory agencies within the vaccination distribution network and how that also contributes to the continuing failure of the network.

**Analysis**

In 2021, the World Health Organization (WHO) declared a target of 70% Covid-19 vaccination coverage by mid-2022 (World Health Organization, 2022). However, by June of 2022, only 30% of WHO's member states had reached the 70% goal (World Health Organization, 2022). Additionally, as of October 2022, 23 of the 33 countries that have less than 35% of their population with at least one dose of a COVID-19 vaccine are located in developing African countries (Holder, 2022). The case study I will focus on the failure of WHO's 70% COVID-19 immunization goal in developing African countries. I will use the failure of this goal paired with vaccination rates as a basis to apply ANT and highlight how WHO failed during the

early stages of network formation. Additionally, I will show how pharmaceutical companies have destabilized the network required for global vaccine distribution.

First, I will reconstruct how the COVID-19 vaccine distribution network is laid out in order for the analysis of the network to follow. The first step in this process is to define the heterogeneous actors that are present in the network. Using a document published by the primary actor, WHO, that details WHO's strategy to achieve 70% global Covid-19 vaccination by mid 2022, I have identified the central human or organizational actors (WHO, 2022). These actors are defined as follows: (i) high coverage countries (HCCs) (e.g G7 countries like the United States, France, Germany, Italy, Japan, the United Kingdom, and Canada, EU countries) who had excess doses that would have benefited low coverage countries, (ii) Vaccine Manufacturers (e.g Pfizer and Moderna) who produced mRNA COVID-19 vaccines, (iii) COVAX, a group created by WHO in 2020 and directed by the GAVI vaccine alliance, the Coalition for Epidemic Preparedness Innovations, and WHO, (iv) WHO, which was responsible for setting the COVAX target goals and ensuring COVAX's success, and (v) developing African countries who were in need of access to COVID-19 vaccines. Similarly, I have identified the central non-human or technical actors by reviewing WHO's provided strategy and a study on the challenges of COVID-19 vaccine inequality (Asundi et al., 2021). These actors are defined as follows: (vi) the mRNA COVID-19 vaccines that were available and (vii) the advanced production and cold storage technology required to make mRNA vaccines. Based on the strategic report released by WHO and the role WHO plays overseeing global health problems, I assume that WHO is the primary actor that formed the COVID-19 vaccine distribution network for developing countries through translation.

The general COVID-19 vaccine distribution network is represented in Figure 1, with the primary actor, WHO, highlighted in blue. Applying Callon's principle of translation, the first phase of the translational process is problematization. During this phase, the network builder, WHO, defined the problem of global COVID-19 vaccine inequity. Based on this problem, WHO was able to identify that vaccine manufacturers were required in order to increase the available COVID-19 vaccines and HCCs were needed in order to donate the surplus of vaccines. Additionally, WHO created a group called COVAX to oversee the COVID-19 vaccine distribution. As seen in Figure 1, WHO lays out the network by connecting the other human actors around themselves at the OPP.

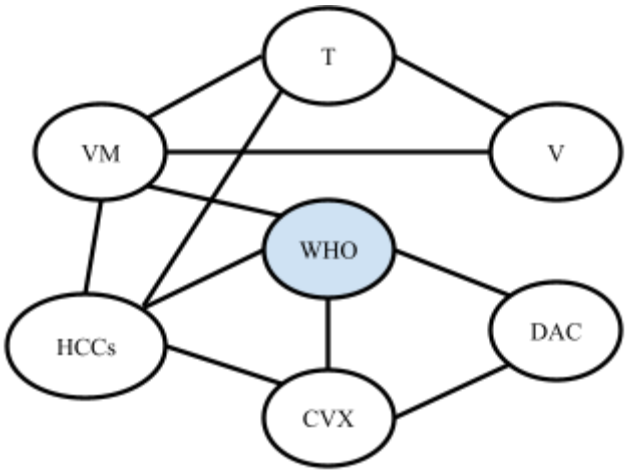


**Figure 1** – The COVID-19 Vaccine Distribution Network, WHO is for World Health Organization, V is for COVID-19 Vaccines, T is for production and storage technology, VM is for vaccine manufacturers, HCCs is for high coverage countries, CVX is for COVAX, and DAC is for developing African countries.

During the next step of interessement, WHO recruited the other human actors by aligning their interests to the problem at hand. WHO first recruited the developing African countries, who were the ones in need of COVID-19 vaccines. Then, WHO recruited COVAX by changing the COVAX goal to 70% worldwide COVID-19 immunization. Next, WHO recruited the HCCs to donate their excess vaccines to prevent the spread of new variants in low vaccinated areas (Asundi et al., 2021). Finally, vaccine manufacturers were recruited to fulfill their intended purpose of producing COVID-19 vaccines sharing manufacturing knowledge to increase immunization globally. In an ideal enrollment scenario, COVAX, developing African countries, HCCs, and vaccine manufacturers each accept their roles and form the intended associations as

seen in Figure 1. In this scenario, vaccine manufacturers would have prioritized the supply of vaccines by increasing production technology and availability and HCCs ensure that excess vaccines were donated. Therefore, the non-human, technological actors were indirectly recruited into the network because, while the vaccines were required for network success, WHO is in direct contact with human actors (WHO, 2022). With the addition of vaccines and technology into the network, COVAX would have been able to successfully allocate COVID-19 vaccines to developing African countries, ensuring the target vaccination goal was reached. Finally, WHO would solidify the connections between themselves and the other human actors, in order for the COVID-19 vaccine to have been distributed equitably and to have completed the mobilization step of translation. However, the current network had underachieved and drastically missed the 40% and 70% COVID-19 immunization goals in developing African countries because of WHO's failure to properly recruit and assign roles focused on technology associated with vaccine distribution during interessment and enrollment. Additionally, the network failed during enrollment due to HCCs and pharmaceutical companies becoming rogue actors by HCCs hoarding vaccines and companies prioritizing money over global vaccine supply. The resulting network has underachieved and created a large disparity in immunization rates between countries.

*WHO's Failure During Interessement and Enrollment*

Regarding the underachievement of WHO's vaccination goal, I argue that WHO failed during the interessement and enrollment stages of the ANT network described above, which destabilizes COVID-19 vaccination network causing continuing inequitable COVID-19 immunization for developing African countries. In the strategy guide provided by WHO on how to achieve the global COVID-19 vaccination goals, it focused primarily on the donation of

vaccines and did not account for infrastructure surrounding vaccine delivery. For example, WHO called for high coverage countries to "take urgent actions to get vaccine doses to lower coverage countries through COVAX" (WHO, 2022). Additionally, during the establishment of COVAX, it was determined that COVAX would "set out to provide vaccine supply fairly and equitably" mainly through vaccine donations (WHO, 2022). However, in a survey conducted by the United Nations Children's Fund in January 2022, about 6 months after WHO's 70% goal was announced, it was found that 44 of the African Union's 55 member states had critical gaps in their cold chain infrastructure (Guarascio & Rigby, 2022). Since cold chain infrastructure is required to keep the vaccines viable when distributing them from manufacturer to patient, a gap would significantly reduce a developing country's ability to distribute donated vaccines. Additionally, it was estimated that in Africa about $5 is needed for delivery for every $1 spent on a vaccine dose (Altindis, 2022). This is significant because if most of the money given to COVAX is focused on doses then delivery problems cannot be solved, thus limiting the amount of vaccines that can reach developing African countries.

In addition to a lack of consideration of infrastructure, WHO also lacked assigning the role of procuring donations. In their strategy guide, WHO only called for other institutions, like the GAVI vaccine alliance and themselves, to ensure funding for COVAX. It was estimated that for COVAX to reach their goal of 70% vaccination rate, roughly 2 billion doses, they would need over $20 billion US dollars (Altindis, 2022). However, in January 2022, nearly a third into the quarter, COVAX had only raised $195 million out of the $5.2 billion it had asked for in the quarter (Guarascio & Rigby, 2022). This is significant because if COVAX does not have proper funding then it cannot fulfill its role of distributing vaccines.

*High Coverage Countries as Rogue Actors during Enrollment*

Additionally regarding the underachievement of WHO's vaccination goal, I argue that, during enrollment, HCCs have acted as rogue actors against the ANT network described above, which destabilizes COVID-19 vaccination network causing continuing inequitable COVID-19 immunization for developing African countries. In the COVID-19 vaccine distribution network, HCCs are supposed to take urgent actions to ensure vaccine doses reach low coverage countries (WHO, 2022). However, it was estimated that even if 75% or their populations were fully vaccinated and 20% received boosters, the G7 and EU countries had a combined 769.8 million excess vaccines in 2021 (Goldhill, 2021). This excess would be enough to provide an extra dose to approximately 75% of the HCCs populations. The large excess in doses displays how the HCCs acted as rogue actors to hoard vaccines rather than properly distribute them to developing African countries. The failure to execute the assigned role during enrollment has destabilized the COVID-19 vaccine distribution network.

I have shown that the HCCs acted as a rogue actor during enrollment through displaying the large excess of vaccines accumulating in the G7 and EU countries. However, others may acknowledge the lead the US has taken on vaccine donations to COVAX. In January 2022, the United States announced that it has shipped over 400 million donated COVID-19 vaccine doses (Stan, 2022). However, this view fails to consider the consistency of donations and the expiration dates of the donated vaccines. In January 2022, it was estimated that the US and partner countries had 240 million expiring doses that were about to expire and most were being used in the donations for political gain (Fandi & Yuwei, 2022). Additionally, several developing African countries were forced to discard more than 3 million doses of the donated COVID-19 vaccines because the vaccines expired within months of being received as donations (Fandi & Yuwei, 2022). Vaccine experts in Africa claim that "[HCCs] stockpile excess vaccines and "donate"

them to African countries when they are about to expire, for political show" (Fandi & Yuwei, 2022). The unusable vaccines drain the expectations and budgets of developing African countries. The donations of expiring vaccines displays that while it appears HCCs are making efforts to donate, the fallacious donations of expiratory vaccines are limiting vaccines available in developing African countries and destabilizing the COVID-19 vaccine distribution network.

*Pharmaceutical Companies as Rogue Actors during Enrollment*

Additionally regarding the underachievement of WHO's vaccination goal, I argue that pharmaceutical companies, specifically Pfizer and Moderna, have acted as rogue actors against the ANT network described above during enrollment, which destabilizes COVID-19 vaccination network causing continuing inequitable COVID-19 immunization for developing African countries. In the COVID-19 vaccine distribution network, pharmaceutical companies are supposed to "prioritize supply and transparency to ensure global equity and share know-how" (WHO, 2022). However, in October 2021 a People's Vaccine Alliance report concluded that Moderna and Pfizer/BioNTech had only delivered 0.2% and 1% of their total vaccine supply to low income countries, respectively (Oxfam International, 2022). The majority of the other doses were sold to rich countries and Pfizer and Moderna each had revenues above $10 billion from their COVID-19 vaccines in 2021 (Kimball, 2022). This differs from the Astrazeneca vaccine, which enacted a "no profit" pledge until the end of 2021 and vowed to still supply their vaccine to poorer nations on a "not for profit" basis (Hart, n.d.). The minimal amount of vaccines supplied to low income countries and high focus on profit by Pfizer and Moderna displays how they acted as rogue actors. The companies failed to prioritize supply, thus, destabilizing the system for vaccinating developing African countries.

In addition to failing the prioritization of supply, Pfiser and Moderna also failed the task of sharing manufacturing knowledge. Both companies patented their vaccine technologies and voted against proposals to transfer vaccine technology to manufacturing areas closer to developing African countries (Agnew & Smyth, 2022). Their reasoning for voting against this is because releasing their technology would severely reduce their profit on the COVID-19 vaccines. The lack of local manufacturers increases the technological barriers for developing African countries and reduces the time available to distribute COVID-19 vaccines before expiration. Therefore, the companies acting as rogue actors by refusing to share technical knowledge is destabilizing the COVID-19 vaccine network in developing African countries.

**Conclusion**

In this paper, I argued that the network around global COVID-19 vaccine distribution failed in the interessment and enrollment stages of translation, causing the overall network to underperform and, therefore, resulted in inequitable distribution for developing African countries. Through the case study of the failure of WHO, specifically in developing African countries, to meet their 40% and 70% COVID-19 vaccination goal by the end of 2021 and the middle of 2022, respectively, I used Actor Network Theory (ANT) to illustrate that WHO, high coverage countries (HCCs), and pharmaceutical companies were the actors responsible for the COVID-19 vaccination network to fail during interessment and enrollment causing the network to underperform in developing African countries. This argument is important because if only production capacity is considered responsible for insufficient COVID-19 vaccine distribution, then the actors contributing to capital, infrastructure, and manufacturing differences would not be fully understood. This lack of knowledge would also limit the understanding of the reasons behind inequitable COVID-19 vaccine distribution in developing African countries.

Word Count: 3482

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