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Colonialism, Health and Healthcare Quality

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I. Introduction

For some, colonization was many generations ago, with centuries between their fight for independence to now. For others, there are communities that were alive while the country was a colony and experienced it firsthand. However, no matter the distance from their colonialism era, the country still feels the effects of this time on their society and institutions. This paper explores longstanding effects colonialism has had on their previous colonies, specifically how it affected the medical infrastructure in these countries. My research question is through what mechanisms do colonial legacies lead to subpar health outcomes and less stable health care institutions in post-colonial nations? I hypothesize that colonization created an environment where: 1) authoritarian regimes could thrive, 2) ethnic fractionalization could be more prominent, 3) and resources can be exploited by those in power. Once present, all these factors contribute to worse health outcomes for the populations and of less stable healthcare institutions.

II. Literature Review

While there is no existing consensus on how colonialism links together with health, there are many literatures that theorize the differing mechanisms on the relationship. One of the most prominent claims is that the current health systems are a replication of the colonialist structure. Ali Murad Büyümm uses specific points from the COVID pandemic and explains its mirror that existed during colonialism. For example, when making decisions on the pandemic, there was a lack of representation from specific communities, making it so only the needs of those in power and those at the table were considered. This practice replicates the colonial system, where the people in power made the decisions for all with no input from others, making it so everything catered to some people, while completely excluding others (Büyümm, 2020). When decisions are made without the considerations of all people, it leads to adverse health outcomes. It inevitably

ends with the health needs of those not in social dominance to be overlooked. They end up with disproportionate access and quality of health or healthcare, making it abundantly clear how this mirrors the hierarchy of colonial times. These power imbalances have been woven into the structure of these countries, so they may be independent, but they still perpetuate this disparity. Other scholars continue this idea with more examples of where colonialism has seeped into these countries and how it has become systemic. The injuries that were caused by colonist ideals, like the restrictions that were placed on the movement of indigenous peoples, the exploitation of locals, and the injustices people of color have faced in the name of medical advancement, are now woven into the current global health (Hussain *et al.*, 2023). This replication of colonialism is seen in relations outside of the country, in the global system, rather than relationships between people in one country. The power imbalances that exist between high-income countries and low- or middle- income countries are argued to echo the relationship between the colonizer and colony (Hussian *et al.*, 2023). Diseases and poverty are ignored in these low-income countries unless they can produce goods for high-income countries to profit off of, specifically the high-income countries that control the medical markets. This broader explanation shows how high-income countries are failing to consider the health needs of the majority of the global population, so the imbalance widens, and health worsens. To conclude, one of the current understandings of the relationship between colonialism and health is how the colonist structure has permeated and is in the structure of these countries now, so their system is a copy of the system that existed then. These literatures work as a broad base to build this correlation, but they lack specifics on the mechanism. Differences that exist between different colonizers and colonies are important distinctions, so my paper will not just state the relationship, but how it exists and what increases or decreases the correlation. There is a decisive lack of specific variables that both papers could

improve on. My research does not use this argument and will improve it by including specific variables that can be measured to show a specific and definite relationship between colonialism, health and healthcare.

Naidu continues this notion with a focus on where modern medical understanding comes from. The current modern medicine is based off western knowledge and understanding, all of which is based on a history of colonization. Not only this, but other kinds of medicine or health practices are seen as inferior or erroneous because it is not derived from colonialism and it does not fit into western understanding. They reason that colonized people were forced to assimilate and suppress parts of themselves (language, ethnicity, ancestral knowledge, pride in their bodies) so they can be the ideal person defined by the colonizers. Colonialism's success depends on colonized people losing their humanity to become whatever they need to be for colonizers (Naidu, 2021). So, any medical knowledge or health practices got overruled by the colonizers force. The modern iteration of colonality is the perpetuation of colonial foundations with the idea that there are some humans who have superiority over others, and that their medical knowledge should be considered with certitude and be implemented universally. This argument also includes the idea of decoloniality. This is an approach that works to resist the contextual effects of colonialism. It sees oppression as something intersectional, institutional, self-perpetuating and multisystemic (Naidu, 2021). It further explains how to decolonize medicine, which is not needed for my research, but is useful to know and analyze for future study.

Current scholars find the addition of race as a variable in this relationship compelling as an argument. Colonialism created an idea of the white colonizers' superiority over the people of color in the colonies; thus, racism exists in the foundation of these countries. In turn, this racism made its way into the medical sector, creating an environment for health to be worse and for

there to be more disproportionalities in their healthcare (Amster, 2022). Researchers have placed emphasis on what health and the healthcare system looked like for many colonies while they were occupied. There were better funded, more modern hospitals for the colonizers, and the local populations were given underfunded and inferior hospitals. Colonizers built these hospitals to ensure that they would always have a labor force to get what they need from the colonies and to prevent revolution, but would not fund them enough to make sure the populations were given more than the bare minimum for their care. This connects to the previous argument, that the structures that were seen in the colonial era are reflected in current day, but adds the specificity that can be found with the race variable. These disparities in the quality of healthcare have obvious effects on health currently. This structural idea that specific people are more valuable than others, especially based on race, ensured for a continuation of an uneven and unequal healthcare system. This literature does well in demonstrating a connection between colonialism and racism, which then is connected to health and health care inequities. This structure of the argument is similar to my research, so it will be used for its argument, as well as an example of this kind of structure. This article is more base level, so it does lack in some analysis and consideration. My research will resolve this issue in part, because I have multiple variables that I am considering, so I can create a full picture of the relationship.

Some scholars extend on this idea past race to include the disproportionality with all identities. Colonizers created a system where those on top all shared the identity of being white, male, heterosexual, cisgender, able-bodied, and Christian. They argue that this system persists in current day, and there are disproportionalities with all social identities (Yosef, 2024). These empires depended on a hierarchical relationship where the indigenous and colonized people exist as the “other” to the colonizers. To further explain this idea, if they were not a part of the

identities listed before, then they were the “others” of the hierarchy and existed at the margin. Colonialism created an obvious division in the world, with those who are civilized and should have privilege, and those who are not and should be oppressed (Ashcroft, 2007). This bleeds into our current world and medical sphere where racism and other discrimination exist and affect the health and healthcare for these disadvantaged people. Yosef illustrates that when there is discrimination embedded into the system it causes people to get avoidable diseases and even premature death among already underprivileged groups (Yosef, 2024). As mentioned previously, colonial systems and ideals did not stay in their era, but they followed the progression of time and exist now. Discrimination looks different and has different forms, but the root cause is the efforts to maintain the historical colonial power structure (Devakumar, 2022). For deeper consideration on how this bias or prejudice effects public health, Devakumar *et al* demonstrates how racism is fundamental to determining health and that health professionals need to consider the systemic discrimination that is in place, as well as their own biases. These papers exemplify how colonialism created the system that has race and other social identities play such a role in modern medicine and healthcare. Ashcroft writes a deep examination of post colonialism in its depth, but because of the extent of this topic, the mention of any connection to health and healthcare is short and brief. Similarly, Devakumar *et al* focuses on the effect identity and discrimination have on public health and health infrastructure, with only momentary mention of the context and cause being colonization. As for the paper by Yosef, it works well as a more elementary and foundational piece about the relationship but could further its arguments and build on this idea. This is where my research will fill the gap, where even though I am not using race as a variable, I will have an in depth and causal explanation that describes the relationship from start to finish.

Another popular reasoning among scholars is the correlation between the medical research and experimentation that occurred during colonization with current health and healthcare. Researchers found that in colonies where medical practices or research was forced onto the population, the current population is less willing to consent to medical treatments (Lowes & Montero, 2021). This can be seen with the percentage of completed vaccines, as well as treatments like noninvasive blood tests. The effect of colonial medicine proves to be intergenerational because the current generation was not exposed to these practices, yet they feel this mistrust in the health infrastructures. This hesitance and refusal to engage with professional medical institutions caused by historic abuse from this sector, has explicit implications for the health of these populations. Helen Tilley further investigates this idea with the claim that when many of these healthcare services were implemented by colonizers, many times research programs were set up as well, with varying levels of consent from the participants. Colonial empires usually did not concern themselves with the injuries that would befall these uninformed participants that came from these experiments, because their justification was that it was in the name of medical advancements. They crossed ethical lines because at this time there were no existing standards or protocols. In Africa specifically, they were known to deceive, coerce or even threaten individuals so they would have samples for their research (Tilley, 2016). A specific example used by many researchers was the research done for the sleeping sickness, where the treatments were very painful and the drugs potentially could work, but many times for the recipients it caused blindness, brain damage, or death (Tilley, 2016). These unethical practices were not seen in each colony with each colonizer, but the effects from this time are still seen in their health and healthcare today. While this idea is not used as an explicit variable for my research, this paper is useful as context and as an explanation outside of my hypothesis. It serves

as a different perspective of how colonialism affects health. Lowes and Montero lack in investigating the exact consequences that can be seen on the health or healthcare in these countries. Tiley focuses on the history of colonialism and what health/healthcare looked like at that time. They lack in connecting it back to health currently, and this is where my research will pick up. While it is not with this variable specifically, my research will tie all this history back to present day health concerns.

Ethnic fragmentation is understood to be a large consequence of colonialism and is also a large determinant of health. Current scholars have a detailed understanding of how colonial practices create ethnic fragmentation once a country is independent. The main variable used by scholars is communalizing colonial policies (CCPS), defined as the variety of policies that colonizers employed that would increase the strength and permanence of communal boundaries by explicitly recognizing each of these communities as separate (Lange *et al.*, 2021). CCPs are categorized into four ideal types based on how they affect intercommunal relations. The four types are differentiating CCPs, empowering CCPs, accommodating CCPs, and discriminating CCPs. While scholars do separate all of these policies, there is an understanding that some can fall under multiple types simultaneously, so classifications are done according to which one they conform to more than the others, and which one would have the most potential to shape their ethnic conflict. In its most base definition, differentiating CCPs is the largest category with each policy falling under it. It is just the recognition of the presence of multiple communities. But to be fully categorized in this type, the policies must have a limited effect on the other categories of empowerment, accommodation, and discrimination. For example, taking a census and collecting information about the different communities would be a policy under this umbrella. The primary effect of this CCP is that this formal recognition causes people to pay attention to communities,

and their separation, and perceive this country in terms of these communities. The second type illustrated by scholars is discriminating CCPs. These practices are ones that recognize communities, mainly so they can give more privilege to one community, and usually at the expense of the other communities. An example of this category is stacking the military with one community in particular. The argument here is that this promotes ethnic conflict because it increases competition and intercommunal antipathy. The third CCPs, accommodating, recognizes community differences in order to accommodate cultural differences by providing public goods and services specifically for each community. An example of this type is elementary schools offering education in different languages so students can start their education in their mother tongues. The effects of this on ethnic conflict are mixed. It provides communities with resources that are needed and valuable, so from some perspectives this should create a more inclusive system that deters ethnic conflict. However, these policies can also enhance the intercommunal differences and can promote competition in the same way the previous CCP did. So, from this perspective, it can worsen ethnic conflicts. Researchers conclude that because of this mixed effect, overall, there is no general effect that this CCP has on ethnic fragmentation and conflict. The fourth and last CCP is empowering, meaning they recognize communal differences so they can provide them with autonomy and formal power. Rather than providing services that are culturally important, these practices provide the power so they can supply their own services. An example of this is allowing for indirect rule, so these communities have a level of self-rule as well. This is seen to have mixed effects as well. It is similar to the previous two CCPs because it also has the potential to promote competition and create more intercommunal violence in the fight for more power. On the other hand, it can deter this conflict by promoting power-sharing arrangements that are more inclusive. This literature stands alone in my research between these

two variables because of its complexity and depth that it offers. Another way I will utilize this paper is because of its treatment and choices regarding its variable for ethnic conflict. They use ethnic warfare to measure this, and similarity to me, the data only ranges from 1946-2010. My operationalization for my variable for ethnic fragmentation only has very similar years, but because of this both their and my data is lacking for colonies that became independent well before these dates, how they handled this will be important for me to learn. To help curb this potential bias and missing gaps in the data, they made two cases, one that includes these countries that became independent before the data was collected, and one that does not. One thing that I will not be using from this literature is the differences in our final variables. This article connects colonial impact with ethnic fractionalization and then takes it one step further to ethnic conflicts, whereas my next step after that initial connection is to look at the health and healthcare of these countries. Ethnic and linguistic heterogeneity, or fractionalization, has been studied to explain the effects it has on health outcomes. Awaworyi Churchill *et al* uses the health variables of immunization rates, life expectancy and mortality rates, health related infrastructure and staff, and the prevalence of diseases to research this correlation. They found that higher levels of ethnic and linguistic heterogeneity correlate with a decline in the rate of children that get immunizations (Awaworyi Churchill *et al.*, 2017). For the next variable, prevalence of health problems, fractionalization is associated with an increase of various health problems. There is a statistically significant correlation between fractionalization and mortality and life expectancy. This relationship is the strongest of other variables and is the key determinant in the connection between ethnic fragmentation and health. Lastly, with a more miscellaneous category, higher ethnic and linguistic fractionalization is related to a decrease in the provision of health infrastructure. Overall, researchers agree that there are serious and potentially detrimental effects

of ethnic and linguistic fragmentation on health and health outcomes. This paper is useful in its analysis of regression tests. They found some things to be statistically insignificant, yet they could conclude that there was still some sort of relationship between the variables by adapting and looking at other aspects as well, like standard deviation. Awaworyi Churchill and the other researchers do not include a preceding variable to ethnic fragmentation, which is what my research does by adding colonialism as the initial cause. My research will be combining the ideas from Lange *et al* with the ideas argued by Awaworyi Churchill *et al*, to create the explanation that colonialism leads to increased ethnic fractionalization, which then leads to worse health and healthcare outcomes.

Colonialism has its effects on the type of regime that a newly independent country takes on, and in turn, differing regime types have various effects on health and healthcare. Current scholars separate regime types into two options, democracy or authoritarian regimes, with specificities that create subsections. The main variable for colonialism is length of colonial pluralism, defined as a colony having electoral institutions with at least minimal legislative powers (Lee & Paine, 2024). Their base for all other arguments is that a longer colonial pluralism period usually resulted in a more durable democracy for the newly independent country. On the other hand, for countries that were colonies under colonial pluralism for a shorter amount of time, it was more common for them to become military coups or authoritarian regimes. The pressure for elections, either by white settlers with less power, or by the indigenous populations, led to a more democratic country once independent. The existence of an election, whether inclusive of all people or not, made it so there is a push for representation and autonomy in policymaking, laying the foundations for a democracy once independent. The effect that colonial pluralism length has on regime type, specifically authoritarian regimes, continues into

the medical realm and has effects on quality of health. Kenneth Rochel De Camargo argues that disrespecting civil rights (propensity for violence, misogyny, racism, and other general injustices) are many times inherent with authoritarian regimes, and these present a direct threat to the health of the public. These power imbalances are innate to authoritarian governments, and these power imbalances create health inequities that worsen the health for the whole population (De Camargo, 2025). In other words, they argue that there is an inverse correlation between a concentration of power and a higher quality of health for the whole population. Continually, with autocratic regimes, they do not need to satisfy the needs of a majority of the population, and they can just satisfy the needs of the few, because they are not held accountable by the population (Wigley & Arzu, 2011). Democratic countries are healthier because the representatives are elected and must satisfy a large range of supporters. They must ensure that the policies they are making regarding health are able to reach the broadest segments of the population that it can. All of this is to say that political regimes influence the health of the population because they have power to determine who has access to resources that are crucial for health and mortality. Where this paper lacks is in including control variables and other possible explanations that could explain or be an additional explanation. This is where my research will improve, because of my multiple other variables, health is not being looked at from only one idea or frame, but it is getting a full picture. Lee & Paine do not mention the additional connection of how colonialism and authoritarian regimes affect health and healthcare. In both De Camargo's article and Wigley and Arzu's, they do not include an additional explanation of how colonialism is the context for their argument. My research is combining these arguments to explain how the relationship starts with colonialism, and ends with health and healthcare, with the intervening explanation being regime type.

Some researchers have mixed this previous idea with the next, to create the argument that countries that are resource rich, specifically in Africa, have the tendency to be corrupt (McFerson, 2009). When looking at the level of freedom and political rights these countries are rated, and corruption indicators, there is evidence that certain regime types have more corruption involved, and thus there is more exploitation of resources. Using case studies, researchers found that colonial history explains the current governance in these countries and the usage of their resources. The artificial boundaries that European colonizers drew created a system that allowed for more corruption. Once the colonizers abruptly left, there is a position empty for people to try and grab so they could be in control of the resources, and thus in control of the money. This corruption by elites was heavily driven by external interests, and these extractive industries are working for these rich outside countries. This is not stated explicitly, but this relationship is extremely similar to the one seen between colonizer and colony, and many of these countries that are buying the resources from these countries were also involved in colonization. This research does well in their methods of research, and their case studies are very high quality. The argument is a little weak in terms of explaining the causal mechanism specifically. This argument includes the added point of corruption but does not include health as the main dependent variable. My research will use these case studies as good examples and will use the general basis as consideration, but it will improve the explanatory mechanisms and will continue this idea by including the effect it has on the medical institutions in a country.

Where many scholars spend their time researching topics regarding resources is in the realm of the unequal exchange between the Global North and Global South, and how the Global North is reliant on the Global South for their prosperity. This dynamic is based on the structure of the colonial economy and becomes a cause for underdevelopment and inequality (Hickel *et*

al., 2022). Numerically they found that in 2015, the Global North net appropriated \$10.8 trillion from the Global South, and over their whole period from 1990-2015, they found that the North drained \$242 trillion from the South. This exploitation of these previous colonies, specifically the exploitation of their resources, mirrors that of the colonial system. Rich countries and corporations use their political and commercial dominance in the global economy to cheapen the prices of resources or labor in the South. Thus, for any imports that the South gets from the North, they must export much more resources and labor to make up for it. The only difference between this system and the one during colonial era is that there is no overt coercion involved, and the pressure is hidden and more subtle. To continue, this power that the richer countries have gained is just because of their GDP. High capacity for net appropriation is correlated with economic power, measured by GDP. Therefore, the only thing that allows these rich countries to maintain power and price inequalities is the fact that they are rich (Hickel *et al.*, 2022). In short, the rich countries continue to increase their GDP by exploiting and extracting resources in a manner that replicates the colonial economy. This idea can be expanded by including the effect these trading policies have on the health of their populations. Teresa Cyrus created six pathways and a mechanism for each, describing how different trade policies impact the health of the people in the country exporting. The first is trade affecting health by raising the living standards in this country. The mechanism here is that a growth in the GDP per capita would create a reduction in material deprivation, thus reducing mortality and increasing life expectancy. Of the six pathways, this is the only one that hypothesizes that increased trade would benefit the people in these countries. With this idea they mention multiple caveats though, which are target parts of my research. In countries where they are rich in resources, and their exports are their primary goods, there is usually more corruption in these countries, impairing growth and making it so the effect

is actually adverse. The second pathway is that trade affects health by changing inequality. With increased trade comes a rise in income inequality, then because of this there is increase in stress and a reduction in social cohesion, thus increasing mortality rate and reducing life expectancy. When investigating this claim, researchers find little evidence of the casual link from inequality to health, so this pathway is not found to be a pathway from trade to health. The third pathway is that trade affects health through the changing labor market. The increase in trade causes an increase in unemployment and a reduction in earnings. From here it leads to worse physical or mental health, causing higher injury rates. The fourth pathway is that trade affects health through changes in the environment. This mechanism is very simple, where an increase in trade leads to an increase in pollution, thus increasing mortality. This pathway dives into my research partly, where the resources that are being extracted cause harm to the environment and worsens pollution, thus worsening health for those in the surrounding areas. The fifth and second to last pathway is the impact trade policy changes have on the markets for particular goods. This is the idea that consumers' priority is always prices, so if there are lower prices due to trade of things like, alcohol, tobacco and processed foods, this will in turn have other effects on the countries. These goods that are getting reduced in price are getting bought more often, even though their impacts on health are known. The last pathway is that trade policy influences the regulatory spaces. The mechanism here is that with trade agreements, there is longer patent protection, so there is now an increase in pharmaceutical prices, making a worse health outcome. Some trade policies influence governments and their ability to enforce or even enact legislation that affects health. This pathway is one that will work with my research best. It claims that in negotiations, the poorer nations must give large concessions to the larger, richer countries, so the markets of the richer countries are more secure and ensured. This is useful to my hypothesis because it is

another example of how this current relationship is similar to the relationships during colonial times. Continually, this paper is important to my research on resource exploitation, because countries are extracting their resources in order to make money by trading them, so even though it is not explicitly stated in this paper, it goes along with my hypothesis. For the purpose of my research, the paper by Hickel *et al* will help me connect my variables of colonialism and resource exploitation. This literature does well at explaining the historical context of these inequalities in the relationship between these countries, and it also paints a good picture of what is allowing it to continue in our present day and what it looks like now. However, this literature lacks the connection to health and healthcare, which is how my research will fill this gap. The focus on the causal pathways by Cyrus is useful for my research because rather than just using statistical significance to prove a relationship, it investigates the specific causal mechanisms that are potentially the explanatory variable. Cyrus lacks full understanding and implementation of the context that is colonialism and how that is integral for each pathway from trade to health. My research will include this aspect and ensure the full story is included in any argument.

III. Thesis and Theory

Colonialism has integrated itself into many foundational parts of the world we live in, the scope is significant, almost encompassing the entire globe. The world has largely moved on from this era of colonization, but to understand the full picture, studying this period and its present-day effects is critical. As a reminder, my research question is through what mechanisms do colonial legacies lead to subpar health outcomes and less stable health care institutions in post-colonial nations?

For the purpose of this study, I define colonization as the subjugation of people or area by a foreign nation that controls as an extension of state power. I define health as the state of being

without disease or injury and existing with complete physical and mental well-being. Healthcare is defined as institutions and systems of licensed and trained professionals that provide means to maintain or restore physical and mental well-being.

My hypothesis is that colonization created an environment where authoritarian regimes could thrive, where ethnic fractionalization could be more prominent, and where resources can be exploited by those in power. Then in turn, all these factors are indicative of worse health outcomes for the populations and of less stable healthcare institutions. Therefore, I believe that the correlation between colonialism and the health variables is not direct, but these variables in-between are the explanatory component of this research. The idea is that there are multiple aspects that came from colonialism that all come together to explain the phenomenon of disparities and differences in health and healthcare across the globe.

IV. Research Design and Methods

For this research, the variables can be separated as such: colonization variables, ethnic fragmentation variables, regime type variables, resource variables, and health and healthcare variables. The colonization variables are the independent variable. The operationalization for this variable is the length a country was colonized, the difference between the length a country was colonized minus how long they have been independent, who was their last colonizer, and who was their longest colonizer. The ethnic fragmentation, regime, and resource variables are all the intervening and explanatory variables for my research. There is an ethnic fractionalization index that scores countries on their level of ethnic heterogeneity throughout the years, and this will be used for the data on the ethnic fragmentation. For the regime variables, it will be operationalized with data on what government types these countries have had since independence and how long they had each type. Lastly for this section of variables, resource extraction will be studied

qualitatively with a case study. For the dependent variable, this is the health and healthcare variables. For health, I will use life expectancy and estimated maternal deaths. For healthcare, I have data on the density of physicians and the government expenditure on healthcare.¹

My method for this research will be utilizing both quantitative and qualitative approaches. I will use quantitative methods for the variables of ethnic fragmentation and regime type. With each of these variables I will run two sets of regression tests. The first will be finding the relationship of these variables with the colonization variables to see the effect colonialism has on ethnic fragmentation and regime type. Then after, I will do the same process but between these variables and the dependent variables to see how these variables affect health and healthcare. If there is a strong correlation between colonialism and these variables, and after, there is a strong correlation between these variables and health or healthcare, then it can be concluded that there is a relationship between colonialism and health/healthcare, but it is just not direct. From here, I will explore the last explanatory variable, resource exploitation, using qualitative methods, specifically a case study. I will look at a country and study their history of colonialism, the context of how the colonizers exploited resources, and what resource extraction looks like in the country now. Then from here I will investigate the connection between resources and health and see through what mechanisms the connection stem from.

This mixed methods approach is best for my research because with these variables there are some that fit better with quantitative and some fit better with qualitative. By utilizing both quantitative and qualitative methods I am able to get the best from both worlds. The quantitative

¹ Alternative measures of health/healthcare variables include: infant mortality, hospitals per square mile, noncommunicable disease mortality rate, and more.

side can be more generalizable and has a concrete number that can prove the relationship and have more explanatory power. It is easily replicable, and it is objective with little room for interpretation. With the size of the data samples and the fact that the tests will have to be run twice for each variable, it is better and quicker to do so with quantitative methods. On the other hand, this method can miss aspects of the phenomenon that are not measurable numerically. For example, it would be very difficult to make the nuanced variable of resource exploitation into a numerical value that can be measured. Therefore, this is why my research is mixed method. With qualitative analysis, the gap can be filled, and a deeper, more nuanced analysis can be done. This topic is complex, so to be able to cover all its sides, a mixed methods approach is best.

Continually, the difference in size and scope of the two methods complement each other. The quantitative dataset has 63 countries, and the rows total to around 6970. These larger sample studies are best when detecting statistical significance, or to test theories. They lack specifics about what is going on behind the numbers. To complement this, the qualitative research consists of one case study. This small and one sample research method is best to develop theories, so it picks up where the other method lacks. This will be a very specific part of the research, where I will be looking into the history and specific mechanisms that cause the phenomenon in this country only. It can also work as a model and could guide other case studies for different countries on this topic.

The data that has been collected is as follows. There are 63 countries that used to be colonies, varying in location and colonizer. They also vary in which era they were colonized, whether it was before or after the 20th century. Then, years are listed from the year they gained independence to current day in 2025. So, all the variables' data also spans these years to see the changes since independence.

For gathering data on the independent variables, I looked at historical information for these countries. First, I looked at what years these countries were colonies, and what countries they were colonies of. Along with this I looked at how many colonizers a country had. From here it was easy to also see which country they were a colony of the longest. Lastly, for these variables, I looked at when these countries became independent and structured the dataset to span from their independence to now. This data was collected from the Colonial Dates Dataset made in 2019 posted to the Harvard Dataverse.

For data on the variable of regime type, I looked at what regime types these countries have had since independence. Then I listed it in the dataset to correlate with the years to see what type they had and when, and how often they changed regime type. There are four options: liberal democracy, electoral democracy, electoral autocracy, and closed autocracy. To classify these, in a liberal democracy, citizens are equal before the law, they have further individual rights, and there are checks and balances on the executives. The only classification for an electoral democracy is that citizens can participate in free and fair multi-party elections that are meaningful. Electoral autocracies are where citizens have the right to choose their executive and other legislature with multi-party elections, but they lack some freedoms like freedom of expression or association. The last is closed autocracies, which are where citizens do not have the right to vote for their executive or legislators through multi-party elections. This data and classifications came from the Our World in Data Democracy Indicator that has data from 1789 to 2024.

For the data on ethnic fractionalization, there is the Historical Index of Ethnic Fractionalization Dataset, that has scores for each country from the years 1945-2013. It scores 0-1, and the closer it is to 1, the more ethnically heterogenic that country is. This data is formulated by the probability that two random individuals in a country are from different ethnic groups. I

placed these scores in their corresponding years for those countries in my dataset. This index was made in 2019 by Lenka Drazanova and was published to the Harvard Dataverse.

Lastly, for gathering data on the dependent variables, there were multiple datasets used. For life expectancy, data from the Human Mortality Database and their life expectancy indicator was used. There were a few countries that were not included in this dataset, so to supplement these absences, the Life Expectancy at Birth dataset from the Clio Infra Dataverse was used. For data on maternal mortality, it was operationalized through estimated maternal deaths. The data was compiled from the Our World in Data Number of maternal deaths by region indicator. The source of this indicator came from United Nations Maternal Mortality Estimation Inter-Agency Group. For the first healthcare variable, percent of government expenditure on health, the data came from the World Health Organization's Global Health Expenditure Database. The last variable was density of doctors, whose data came from the World Bank Group and was operationalized as how many physicians there are per 1000 people. All these datasets for the dependent variables are also separated by years, so they are put in the data set with the data from that year.

V. Quantitative Findings and Data Analysis

The data from this study can be split into two sections: ethnic fragmentation and regime type. Each section has two sets of independent and dependent variables. In the first data set, ethnic fragmentation serves as a dependent variable when measured against colonialism. It also serves as an independent variable when measured against population health and healthcare quality. Then the same format is applied to regime type. First it acts as the dependent variable when measured against colonialism. Then it becomes the independent variable when measured against population health and healthcare quality. There is a strong relationship found between the

first set, (colonialism and regime type/ethnic fragmentation), and a similarly strong relationship between the second set, (regime type/ethnic fragmentation and health/healthcare). It is safe to conclude that there is a relationship between colonialism and population health and healthcare quality.

In analyzing colonialism and ethnic fragmentation, I fit a linear regression model to predict the level of ethnic fractionalization with colonial length as the predictor. This resulted in a statistically significant p-value ($< 2.2e-16$), with a positive coefficient, meaning that there is a strong chance of the relationship that the longer a country was colonized, the more ethnically fragmented it became. Although this resulted in a statistically significant relationship, the graph in Figure 1 gave me the visual to question the operationalization of colonialism as colonial length.

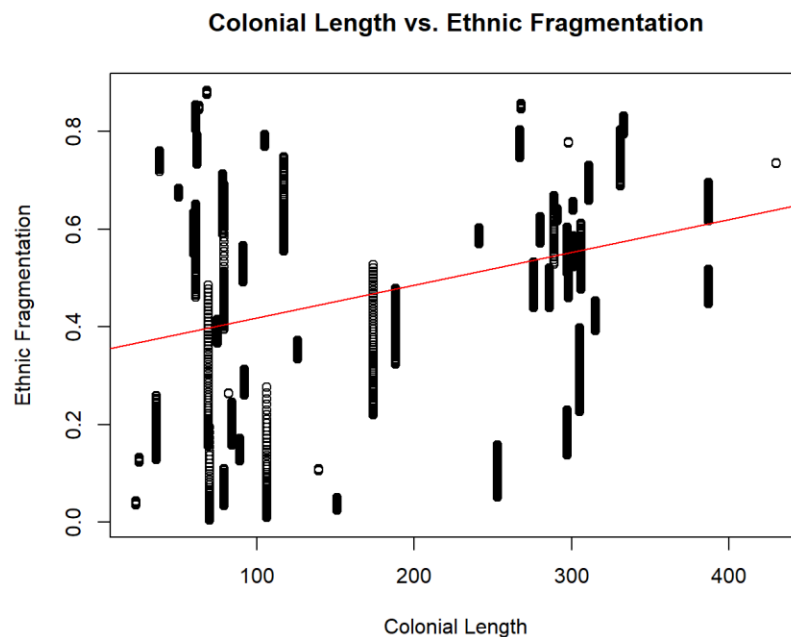


Figure 1: Scatterplot of colonial length vs. ethnic fragmentation

For the 63 newly independent countries of this study, colonial length is a stagnant variable, while the variable of ethnic fragmentation changes year by year. To be able to ensure that this kind of disparity is not a hinderance to my results, I created a new variable. This new variable measures the impact of length of time since colonialism on ethnic fragmentation as it informs health and healthcare. In other words, the higher the number is, the longer a country was colonized, but also it may be younger in its independence. With this new variable, it is no longer stagnant, and it is moving along with the years, like the ethnic fragmentation variable. The regression model with this new variable resulted in a p-value of $< 2.2e-16$, and a positive slope coefficient. This can be analyzed as a positive relationship between the ratio of colonial rule to independence as it reflects relative ethnic fragmentation. That is, the longer a country has been an independent state, the lower the impact of colonial rule on ethnic fragmentation.

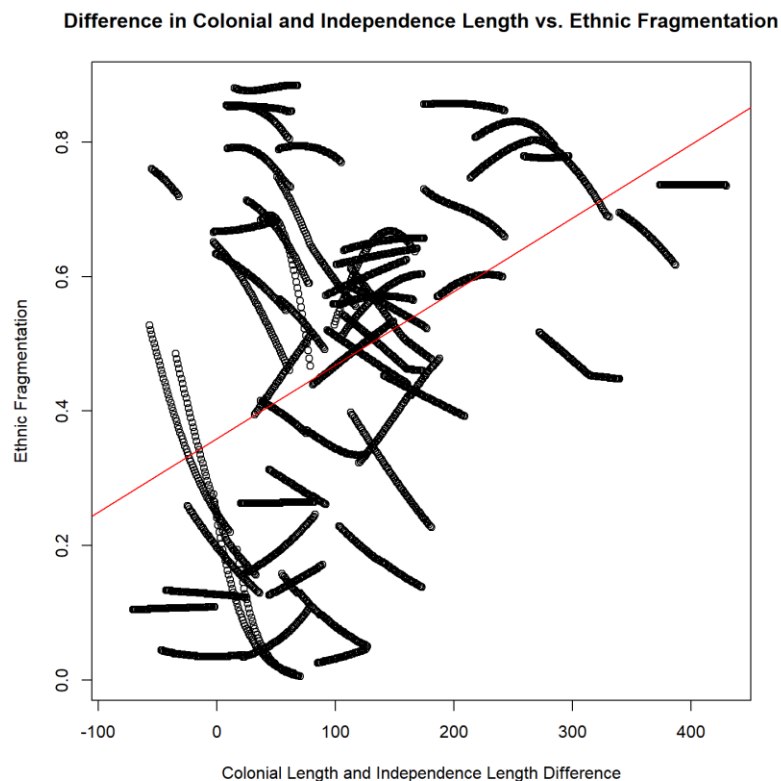


Figure 2: Scatterplot of difference in colonial length and independence vs. ethnic fragmentation

To conclude this part of the hypothesis, I moved on to comparing ethnic fragmentation to health and healthcare variables. As a reminder, there are two health variables, life expectancy and maternal mortality, and two healthcare variables, health expenditure and physician density. I fit a linear regression model four times, one for each dependent variable, to predict the quality of health and healthcare with ethnic fragmentation as a predictor. In using life expectancy as the dependent variable, results showed a p-value of $< 2.2e-16$ and a negative slope coefficient of -10.5241, as shown in Figure 3. This means that the more fragmented a country is ethnically, the lower their life expectancy.

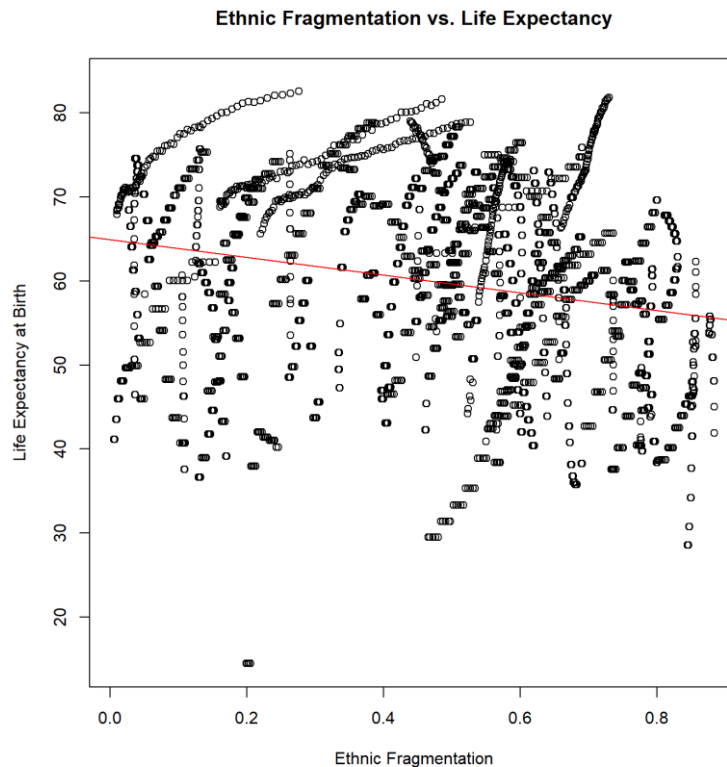


Figure 3: Scatterplot of ethnic fragmentation vs. life expectancy at birth

For estimated maternal mortality as the dependent variable, the regression resulted in a p-value of 0.001302. This is still below the cutoff, so it is a statistically significant relationship, with the scatter plot in Figure 4 exemplifying that the more fragmented a country is ethnically, the more maternal deaths there are. This relationship may be less significant with a less steep slope because estimated maternal deaths could be skewed by population. To see if population did influence this variable, the estimated maternal deaths were transformed logarithmically to change the unit of measurement. It is now an order of magnitude, rather than absolute numbers. A change in one unit of the log transformed variable indicates an increase or decrease by a factor of ten in the original variable. With this new variable, the p-value is $< 2.2e-16$, with its relationship shown in Figure 5.

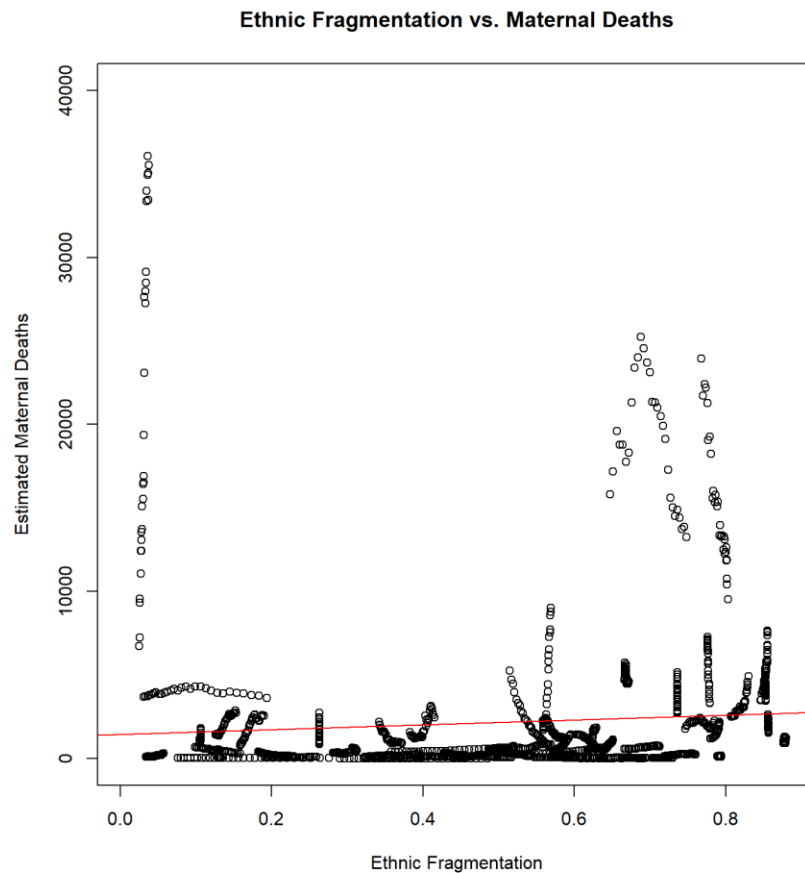


Figure 4: Scatterplot of ethnic fragmentation and estimated maternal deaths

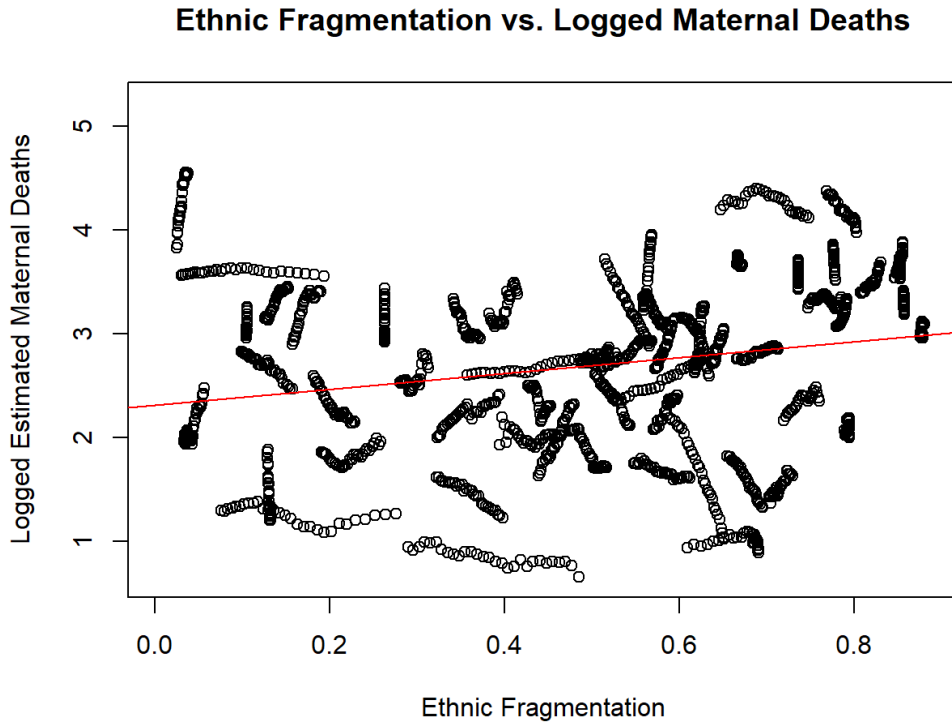


Figure 5: Scatterplot of ethnic fragmentation vs. log transformed estimated maternal deaths

This new transformed variable shows a stronger statistical significance, resulting in the confirmation that the more ethnically fragmented a country is, it is likely the higher their estimated maternal deaths are.

The same calculations were made between ethnic fragmentation and the healthcare variables (government health expenditure, physician density). For government health expenditure, the linear regression model predicts what percentage of that country's GDP is spent on health infrastructure, with ethnic fragmentation at the predictor. Government expenditure on healthcare informs the quality of healthcare in a country because it communicates how well-

funded the institutions are and how much the government prioritizes healthcare. The statistical significance here is high, with a p-value of $1.653e-10$ and a negative slope. Both lead to the idea that the more fragmented a country is ethnically, the lower amount of money the government spends on health.

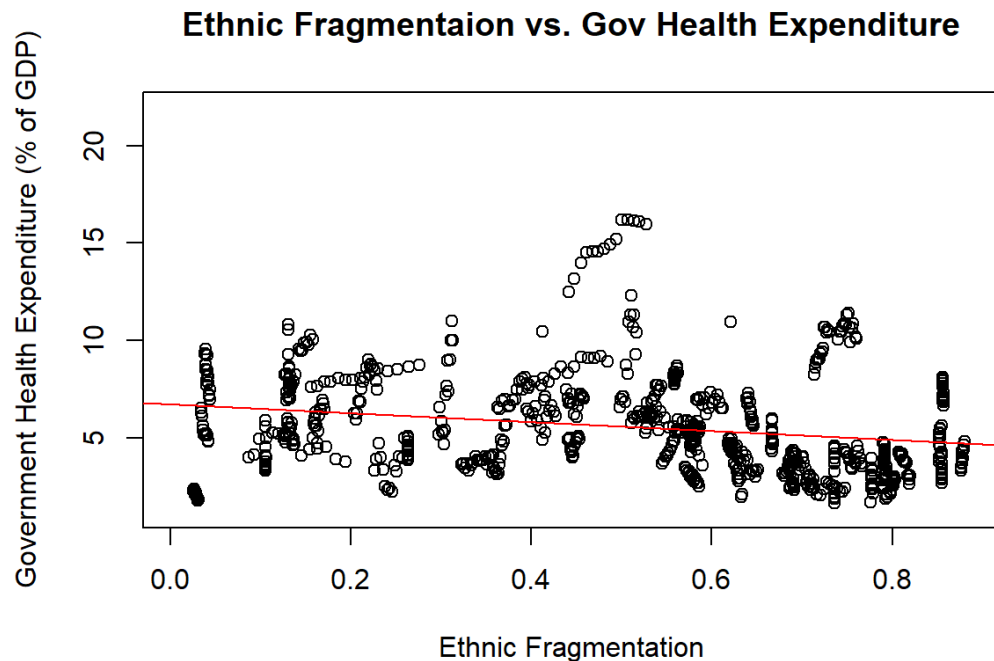


Figure 6: Scatterplot of ethnic fragmentation vs government health expenditure as a percentage of GDP

For the last test with ethnic fragmentation as the predictor, it is the same linear regression model, but this time it predicts the number of physicians per 1000 people. Physician density allows for inferences about healthcare institutions and the quality of medical programs in the independent country. This resulted in a p-value of $1.331e-08$, statistically significant, and a slope of -0.76041 . This evaluation shows that the more fragmented a country is ethnically, the less doctors there are.

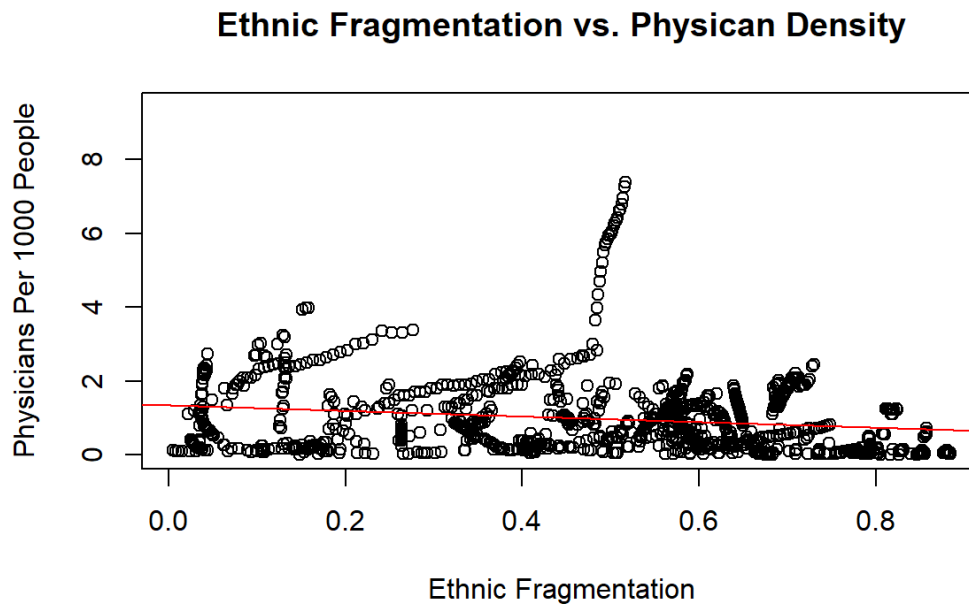


Figure 7: Scatterplot of ethnic fragmentation vs. physicians per 1000 people

In analyzing these results, when a larger gap and more pronounced difference exist between different ethnic groups, there is more competition for resources, including health resources. This will end with inequity with the distribution of health resources, which is indicative of lower quality of health and healthcare. These disproportionalities represent how large ethnic fragmentation leads to unequal health quality and lower standard for healthcare infrastructure.

With each of these tests showing statistical significance, and with the slope coefficients going in the right direction, the two sets of tests can be connected to conclude that there is a relationship between colonialism, health and healthcare through the mechanism of ethnic fragmentation.

The second phase of testing used regime type as the main explanatory variable. First it served as the dependent variable when examining the impacts of colonialism. Then it served as the independent variable in its impact on population health and healthcare quality. Regime type is split into four different categories (liberal democracy, electoral democracy, electoral autocracy, closed autocracy) and is treated as a binary variable. So, whichever type of regime that country had that year is labeled (1), and all others are labeled as (0). It is an atypical binary variable because there are four categories, but it makes more sense when looked at through a yes/no lens instead of an autocracy/democracy lens. A (1) signifies “yes, that was the regime type they had that year”, and (0) is “no, this was not the regime type”. When first running these t-tests, or comparison of means, there was statistical significance for each type of regime with the difference in colonial versus independence length, except electoral democratic regimes. I realized that even with this statistical significance, there is a conceptual issue with the separation and specification in my regime type variable. My initial distinction between two types of autocracies and two types of democracies caused a problem. The hypothesis here is that all types of autocratic regimes affect population health and healthcare quality in a negative way. However, with these four variables, when looking at one type of regime, it is being compared to the opposite types of regimes and the one regime that is the same broad classification. It is the one comparison against a similar kind of regime that creates the problem.

In practice, testing maternal mortality and closed autocracies, the average maternal mortality from countries with closed autocracies (1) is greater than countries without (0), but there are still the electoral autocracies that are being considered in the (0) category. This could affect the tests because the inclusion of the same type of regime in the “not” or zero category. This led me to combine liberal democracy and electoral democracy into democracy, and electoral

autocracy and closed autocracy into autocracy. While extra specification may be helpful in some instances, in this case, the closeness in definitions and majority of similarities over differences between them made combining them a more efficient methodology. Therefore, there is a new binary variable that is only two options, designated (1) for democracies and (0) for autocracies. In the alternative hypothesis, the difference between colonial length and independence on average would be greater than when it is a democracy. This comparison of means resulted in a statistical significance of $<2.2e-16$ as a p-value. The boxplot in Figure 8 shows that same relationship.

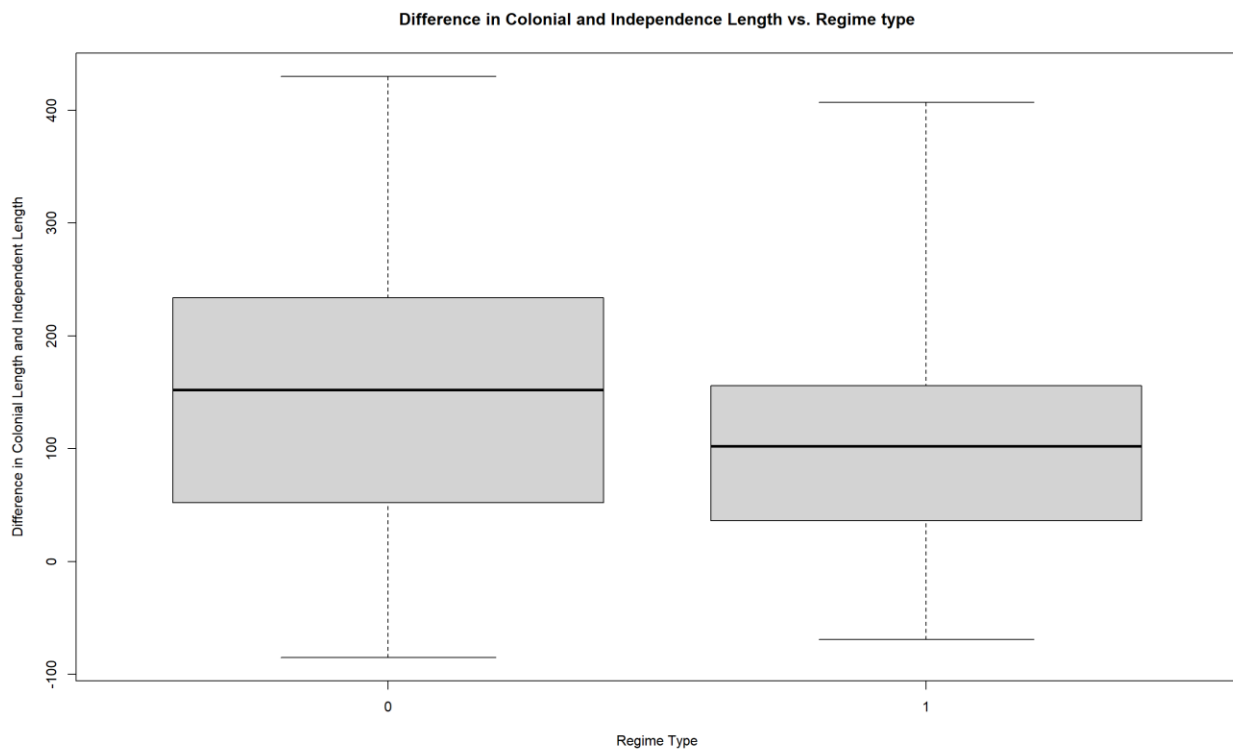


Figure 8: Boxplot with regime type vs. difference in colonial length and independence length

Therefore, when a country is an autocracy, there is a higher chance that it had been a colony for a longer time, or it has become recently independent from colonization. These tests correlate with

my hypothesis that colonization has an effect on regime type, where it creates an environment that is more conducive for an autocratic regime.

The last part of these tests was between regime type and the dependent variables of population health and healthcare quality. As a reminder, there are two population health variables and two healthcare quality variables, so four mean comparison tests were run with regime type. The first was a t-test with life expectancy. The alternative hypothesis for these variables is that if the country was an autocracy, the average life expectancy would be less than the average for a democracy. The p-value was statistically significant at $< 2.2e-16$, meaning that there is a high probability that the alternative hypothesis is true, as demonstrated in Figure 9.

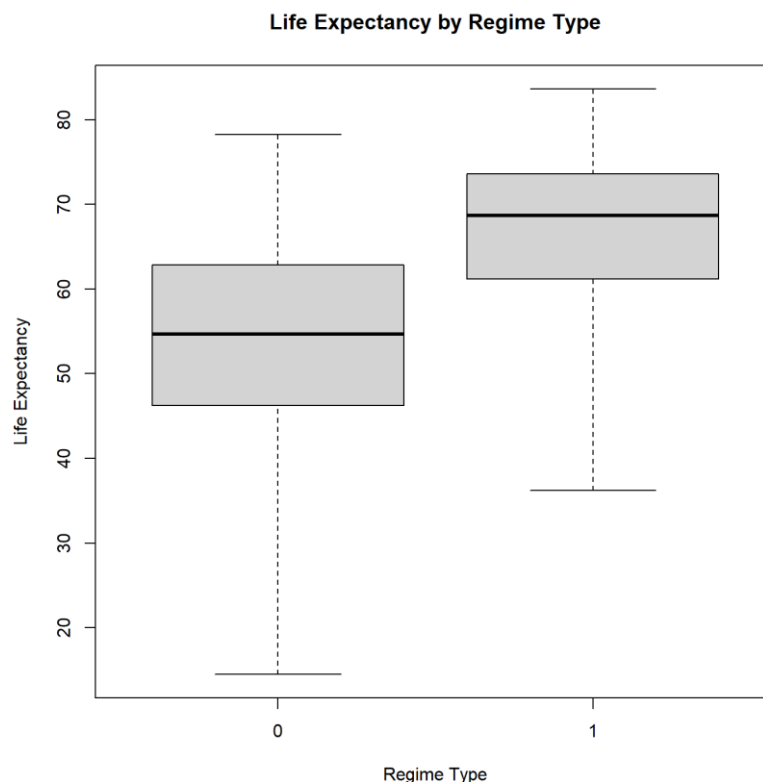


Figure 9: Boxplot showing life expectancy by regime type [autocracy (0) and democracy (1)]

The next test was done with regime type and estimated maternal mortality. This resulted in a boxplot, shown in Figure 10, that illustrates the mean for a democracy is less than that of an autocracy. The alternative hypothesis is that when a country is an autocracy, the average estimated maternal deaths is greater than it would be in a democracy. However, the results were not statistically significant, with a p-value of 0.9991, meaning there is a very low chance this relationship is true. Similar to the earlier test with estimated maternal mortality rates and ethnic fragmentation, to ensure this result is not due to any sort of skew that could come from population, the tests were rerun with the new logged variable. The alternative hypothesis was essentially the same, that the new transformed estimated maternal deaths variable would on average be greater in an autocracy than it would be in a democracy. This comparison of means resulted in a p-value with statistical significance, $3.031e-16$. This illustrates that population does have an effect on estimated maternal deaths, and there is a high probability of a relationship between regime type and estimated maternal mortality.

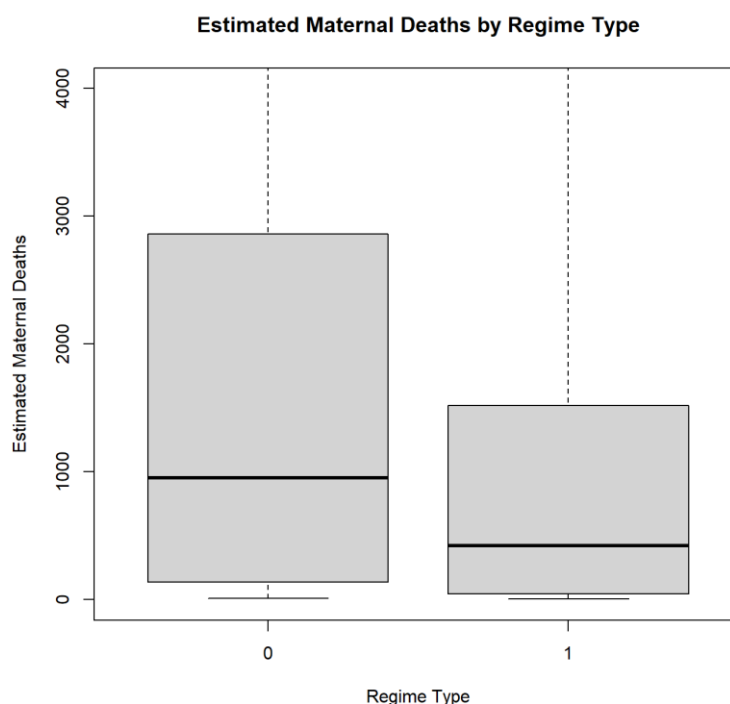


Figure 10: Boxplot with estimated maternal deaths by regime type [autocracy (0) democracy (1)]

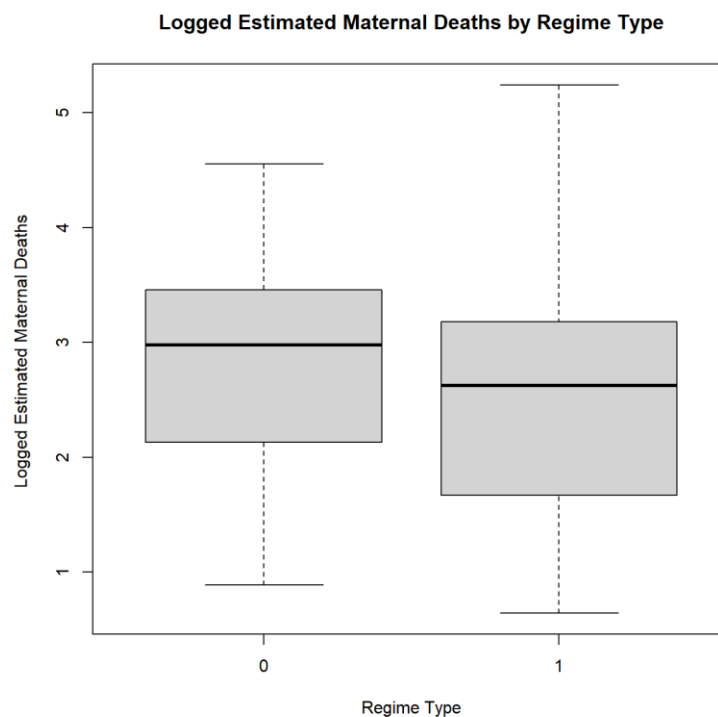


Figure 11: Boxplot of log transformed estimated maternal deaths by regime type [autocracy (0) democracy (1)]

The final section for the quantitative research analysis is regime type tested against healthcare quality (health expenditure, physician density). These tests were also done with mean comparisons and boxplots. The first tested health expenditure as a percentage of GDP. The alternative hypothesis here is that in an autocracy, the average percent of health expenditure is less than the average in a democracy. This concluded with a p-value of $2.2e-16$, high statistical significance again, and a correlating boxplot shown in Figure 12. This demonstrates that there is a high chance that a lower amount of money is spent on healthcare by autocracies than by democracies.

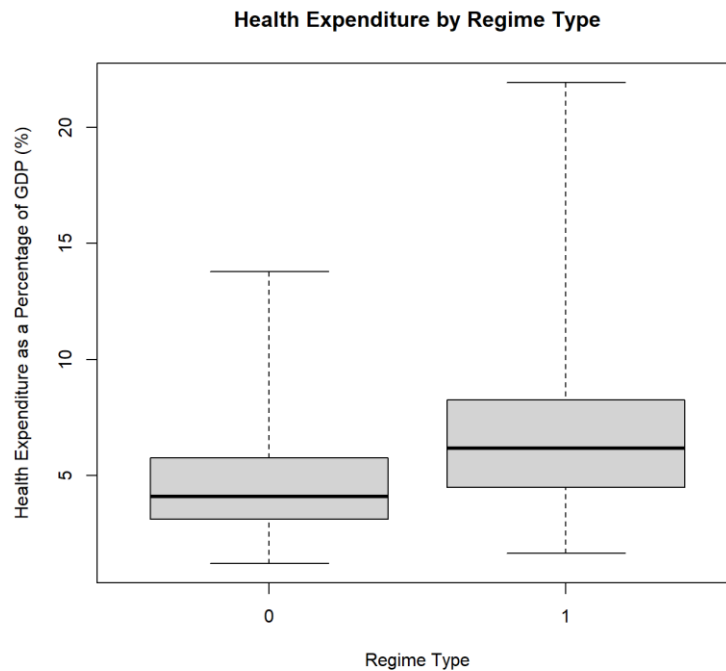


Figure 12: Boxplot of health expenditure as a percentage of GDP by regime type [autocracy (0) democracy (1)]

The last test run studied the number of physicians per 1000 people against regime type. The alternative hypothesis states that for an autocracy, their average number of physicians for every 1000 people is less than that of a democracy. This hypothesis proved to be statistically significant p-value of $< 2.2e-16$. The box plot corroborates this idea, meaning that there is a very high chance that an autocracy means for a smaller average density of physicians in a country.

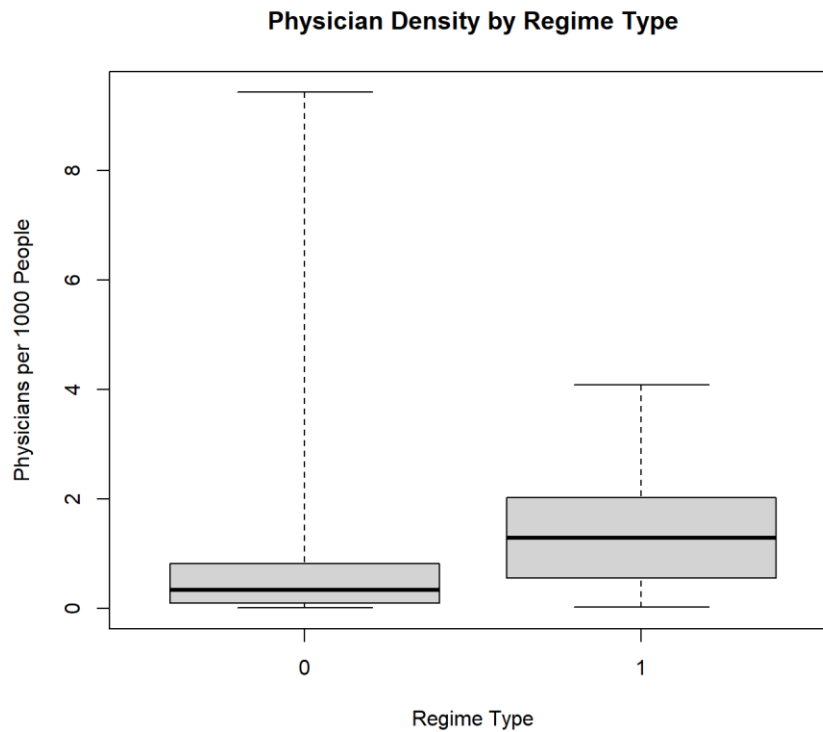


Figure 13: Boxplot of number of physicians per 1000 people by regime type [autocracy (0) democracy (1)]

The causal explanation for the relationship between regime types and these dependent variables involves the power and priorities of the two regime types. For authoritarian regimes, it is beneficial for the regime to privilege certain groups of people over others, and with the level of control they possess, it is easy for them to do so. The needs and health of those who are necessary for them to stay in power has the focus while those who are less valuable to their regime can be excluded. Similar to ethnic fragmentation, there are some groups with little or no access to quality health care, while others are in a good standard of health and have access to services when they need it. This causality explains the relationship between regime type and health quality and healthcare access.

With all these comparisons of mean tests resulting in statistical significance in the correct direction, the relationship between colonialism, health and healthcare is shown, through the mechanism of regime type.

VI. Qualitative Research

To wrap up the last part of my hypothesis, I designed a qualitative case study of the resource extraction in the Democratic Republic of the Congo (DRC). In evaluating colonization, consideration must be given to the idea that superiority is inherent, and often the idea of white superiority specifically. The colonizers were the privileged and supreme, and the colonized were the disadvantaged and impoverished. This distinction between the two sides determined their worth and what health they experienced and what healthcare they had access to. In the current day, in these independent countries there is still this dynamic involving two sides with disproportionate access to resources and opportunities, but it has undergone renewal and revision. This neocolonialism dynamic can be seen currently between high income countries and low-income countries. The disproportionality system may have become more complex, but its foundation is still rooted in colonialism. The extractive colonialism of the past is not so different from the current relationship between high income countries and low-income countries, especially regarding natural resources. Rich countries use up 74% of the global resources. These countries rely heavily on the Global South for these resources and the resources they drain are worth over \$10 trillion per year. The exploited countries' economies rely on the exportation of their resources with all their wealth being sent abroad and getting paid much less than their worth. This system seems eerily familiar to the one in place during colonial periods. I argue that the power dynamics between high income countries and low-income countries reflect the relationship between colonizer and colonized, specifically regarding the extraction of resources.

There is still a question of “how does exporting resources worsen the health or healthcare of a country?” I stipulate that there are two main factors connecting excessive trade with health and healthcare. Firstly, the extraction and exploitation of resources breaks-down the environment and ecosystems. Studies show that the state of the environment affects health significantly. The degradation of the environment due to the extraction of resources leads to worsening health. Secondly, these countries are unstable because they are newly independent, and an economy dependent on exportation does not provide inherent stability and can worsen it. This is in-line with the idea of the resource curse. Significant dependence on exportation creates an insecure structure and economy, but the added factor of new independence creates an even more precarious situation. This level of instability can only worsen the health and healthcare of these countries. It results in less protection for citizens, more economic insecurity, and opportunities for conflict, all of which are conducive to worse health and health structures.

All these factors coalesce to form my argument. There are imbalances between richer countries and poorer countries that replicate the colonial ideology. The past colonization system was built to serve the colonizers and to further their objectives, without much thought to its impact on the colonies. This can be seen currently with the trade of resources between the newly independent countries and the older richer countries. Due to the demands of the higher-income countries, the lower-income countries keep pushing and producing more materials to send to these higher income nations, even though there it is harmful to them in the long run. Their own health and well-being can be sacrificed, as long as it benefits the foreign corporations and increases the corporation’s profit. The high level of extraction being done proves how the low-income communities as a whole are expendable, not only the people, but the ecosystems and environment are sacrificed for the sake of corporate profit and Global North priorities. So, in

summation, the past colonial act of pressure and insistence on procuring resources causes the previous colonized people to still emphasize exportation, which leads to worse health and healthcare for these new countries. To explore this concept further, I will develop a case study of the Democratic Republic of Congo, a country in the Global South that was a large exporter when it was a colony and continues to be reliant on exporting after gaining independence.

The Democratic Republic of Congo (DRC) is one of the poorest countries in the world, yet it is also one of the most mineral-rich. It was owned personally by King Leopold II of Belgium from 1874 to 1908, and then was transferred to the entire country of Belgium and was ruled by Belgium from 1908 to 1960. After World War I, there was investment by the United States and European countries for extensive mining and farming plantations of rubber and cotton. The pressure to extract and export these resources came at an extreme cost. The level of violence done to produce these resources with forced labor was severe and extremely oppressive. Half the population of Congo, around ten million people, died between 1880 and 1920. During World War II, the United States imported most of the uranium used in the Manhattan Project from the DRC. This period of extractive colonialism left a large mark on the DRC. Its economy has continued to be heavily reliant on mineral exports since its independence in 1960. Currently, mined minerals like copper, coal, cobalt, and diamonds make up 90% of the exports of the DRC. The mining and production of these resources are put above everything, and the country is left with little to no capacity to focus on anything else. Additionally, not just foreign entities, but it has led to those with power in the DRC to exploit their own people. Herve Diakiese Kyungu, an attorney from the Congo, publicized that foreign extractive corporations, along with high-ranking officials from the DRC, are involved in the exploitation and smuggling of resources (Ojeifo, 2025), while millions of its citizens are left with little or nothing.

Since 1966, throughout the entire DRC, an estimated six million Congolese people have been killed, and almost seven million displaced. Even with newer reforms, there are still around 40,000 child laborers working illegally in dangerous conditions. The type of mining activity that is considered the most dangerous and is the worst for laborers is artisanal mining. Artisanal mining is a labor intensive small-scale mineral extraction process. It is managed by individuals or small groups, instead of a large organization. The extraction uses rudimentary tools or techniques with no formal regulations (Directory, Sustainability). The conditions for the workers have been so poor that there was a court case in 2024 against major tech companies by Congolese workers in *John Doe 1, et al. v. Apple Inc. et al.* Even though there are efforts to eliminate this type of mining completely, the latest numbers still show there are two million people depending on this type of work in order to make a living. These numbers not only speak to the poor condition and dangerous aspects of working in resource extraction, but also point to the overall instability of the country.

The Congo still does not have full ownership and control over their land. A large area, Plantation et Huileries du Congo (PHC), is one of the biggest industrial palm oil producers, standing at over 100,000 hectares. The DRC only owns 24% of this land, the rest is in a private equity fund. The government is fighting to get full control by questioning the legality of these investors' claim due to the lack of documentation and legal processes involved. There are also battles between the fund's shareholders making it more difficult for anyone or group or the DRC to claim control. This land was taken in 1911 by colonial authorities and granted to Lord Leverhulme of Britain. This plantation allowed him and his brother to lay the foundation for Unilever, one of the world's largest corporations. The plantations have been sold since, yet after independence from Belgium the Congolese were not allowed to reclaim this land. This area of

land exists as a colonial loophole, where these investors and foreign countries deprive the DRC of its land, so they can continue to maintain access to these resources. This plantation is where many Congolese are employed, and their work conditions are dangerous and distressing, with the added harm of ongoing structural violence against them (Mousseau, 2024). The communities are suffering because of the owner's lack of regard for their work conditions and for their health and wellbeing. The violence that they endure at the hands of the soldiers and industrial guards from the PHC is also reminiscent of the type of violence that their ancestors experienced from colonial officials (beatings/detentions/murder). Essentially, colonialism is still alive in this part of the DRC, and it is affecting the people of the Congo and their health in a significant way.

Outside investors and foreign entities are taking control over the land and resources and acting as the colonizer for the DRC in present day. Most recently, last year in 2025, Donald Trump created three agreements to be signed by the DRC, the United States (US), and Rwanda. The agreements are described as a milestone for peace and economic growth, but at the center of these deals is the U.S.-DRC Strategic Partnership Agreement (SPA). This agreement fundamentally establishes who has control and access to the coveted minerals in the DRC. These agreements may have been framed to promote peace and new mining practices, yet the SPA outlines clearly that the facilitation of long-term access for the US to minerals from the DRC is the guiding purpose for the agreements. The SPA also created a Strategic Asset Reserve (SAR), which furthered US control over the resources in the DRC. It established a compilation of "critical mineral assets, gold assets and unlicensed exploration areas" to be part of the SAR (United States Department of State, 2026). Essentially, this reserves these resources for the US and that US companies are given first offer for these sites and goods, to the point that they are given preferential access over Congolese investors. This is all overseen by a new Joint Steering

Committee, comprised of five representatives from the US government, and five from the Congolese government. It embedded the US into these decisions, whereas previously it was decided by only the Congolese Government, to increase US control over these areas and commodities. The sovereignty of the DRC erodes because of this external US involvement in resource decisions. This institutionalized foreign oversight over these assets is similar in some ways to the colonial oversight that previously existed.

The US now plays a large role in the development path of the DRC, and its questionable motives are the primary factors for associating this behavior as being akin to colonialism. The interests of the DRC are seemingly being addressed in the agreements, but it is all being overridden by the interests of the US. Even the peace efforts, which are vaguely outlined in the agreement, when seriously considered, can be seen to be for the benefit of the US and US businesses. These examples exhibit the connection between this current relationship with that which existed when the DRC was a colony. Through legal agreements and deals, the DRC has lost some sovereignty and gained more foreign influence all for the benefit of the foreign entity. Colonialism was legal and accepted until it was not, so with this agreement, while it may be legal, its similarities to colonial relationships leave questions about its legality and morality. When foreign interests are prioritized over domestic, especially in this context of resource extraction, the ones that lose the most are the citizens living in the country. In this manner as well, the working conditions and health aspects involved in the extraction process are sidelined to ensure that maximum export is occurring for the foreign investors.

The demand for these minerals from the rest of the world causes an imbalance in priorities that leads to a lack of care for environmental damage, which then creates a space for worse health and healthcare institutions. There is increasing deforestation, land degradation,

species depletion, and heavy metal pollution due to the mining and extraction industries. For example, approximately 15 tons of mercury is used in the DRC's artisanal gold mining annually, making it also a large source of mercury emissions, and the element's toxicity makes it dangerous and hazardous to work. Furthermore, the discharge of contaminants in water is the main environmental challenge with these mining exploitations (Muimba-Kankolongo, 2022). With artisanal mining, the practice of sieving the soil in rivers is causing severe environmental pollution. With an already large insufficiency of potable water in the country, this further reduces that amount quicker, and when this water is consumed or used for crops, it causes serious health problems. The degradation of the farmlands from the mining excursions is causing the vegetation to die, culminating in food shortages and famine. The vegetation that is left over may be contaminated as well, making this food likely poisonous. In the Muimba-Kankolongo *et al* study they found that the health of most people, particularly those that are lower income, display symptoms of malnutrition to the point where it is stunting growth and a majority are underweight. The pollution of the water, soil, and air is affecting the well-being and growth pattern for these populations, especially the children in the DRC.

The African Copperbelt is a mining region in parts of Zambia and the Democratic Republic of the Congo, and it is one of the ten most polluted areas in the world. The metal mining for products like phone batteries and electric cars has caused environmental pollution with high concentrations of toxic metals. Research has shown these metals cause major adverse health effects for the populations living and working in these areas. The study by Muimba-Kankolongo concluded that when the fathers of children worked in mining, their children were most likely to have birth defects. These unsafe and unsustainable mining practices are worsening the health of the people in ways past birth defects as well. Prolonged exposure to mining has

been studied, and high amounts of pollutants in the blood and urine of habitants and laborers in mining areas were discovered (Muimba-Kankolongo, 2022). Similarly high levels were seen in residents of urban neighborhoods that were constructed in areas that were artisanal cobalt mines, with higher amounts seen in children. Children in the African Copperbelt are found to have more traces of toxins in their urine because of their greater vulnerability to these toxins. Children play in these areas with trace metals on the ground and have higher gastrointestinal absorption. Prolonged exposure to these toxic trace elements found in the water and crops (arsenic, cadmium, lead, copper, nickel) have been shown to increase the risk of cancer and other severe health problems. Many people in DRC have been diagnosed with cancer and respiratory issues. Residents also describe negative health impact involving their blood pressure and auditory organs due to noise pollution from mineral operations.

Wealth and power are pitted against the environment and health, and like during colonialism, the former is given precedence. It is not just the resources themselves that are causing these health problems, but the lack of care for the environment is making a significant difference. Zambia is right next door to the DRC and has similar ore resources, yet they have much less concentrations of trace metals in their population. Zambia has environmental monitoring and established regulations that have not been compromised to benefit specific people (Muimba-Kankolongo, 2022). With colonialism there was no care for the environment nor the people who were affected by the environment and that is currently still occurring in the DRC. Zambia with its environmental policies is a good example of how the environment, therefore their health, is not placed below the acquisition of minerals. This is not to say Zambia did not have any trace metals in their inhabitants, but it was significantly lower than the amount and types of trace metals found in the DRC population. It is not only the environment and

resources that are creating adverse health and healthcare outcomes, but also who is in charge of the resources and what they are willing to sacrifice in order to ensure their extraction.

Health in the DRC is very poor. Using the established variables as before, the life expectancy is 61.63 years, and the most recent estimated maternal deaths in 2020 was 21511.26. The healthcare infrastructure is weak as well, there are 0.187 doctors for every 1,000 people, and the government spends 4.34% of their total expenditure on healthcare. Exporting is their main source of income, but it is contributing to worsening health and not allowing for further development and establishment of a better healthcare structure. The DRC will continue to export because without the DRC, the Global North would lose products, so they will continue to pressure the DRC to ensure it remains an export-dependent country. It is important to mention that the ongoing war and violence that the DRC experiences is a confounding variable that can affect these variables. However, other similar resource rich countries that are not in the midst of a war, like Sierra Leone and Liberia, have data that is not that different to what is seen in the DRC. Thus, the Democratic Republic of Congo is an example of how a relationship that mirrors the colonial past has an increasing need to obtain resources, thereby worsening the health and healthcare in a country.

VII. Discussion

This quantitative and qualitative analysis illustrated a correlated relationship between colonialism, health and healthcare through the mechanisms of authoritarian regime types, high ethnic fragmentation, and increased resource exploitation. Firstly, the statistical correlation between colonialism and ethnic fragmentation, followed by ethnic fragmentation and the health/healthcare variables, exemplified that colonialism creates an environment where separation between ethnic groups is larger and more prominent, and this in turn has a negative

impact on health and healthcare. Secondly, the analysis for colonialism and regime type, and then continuation into regime type and the health dependent variables showed how colonialism's foundation is well suited for building an autocracy, and in turn autocracies are worse for the health and healthcare in the country. Lastly, the case study done with the Democratic Republic of the Congo demonstrated how the history of colonialism allows similar control by foreign powers and worse resource exploitation, and how this situation results in worse health and healthcare for those working and living with these countries.

With the extensiveness of colonialism and its vastness, it can be arduous to find a direct correlation with another variable. However, by splitting its effects and finding these middle pieces (ethnic fragmentation, regime type, and resource extraction), the relationship becomes more digestible and concrete. These causal mechanisms are important to understanding what kind of country is left behind after decolonization, and what needs to be done to take colonialisms claws out of these independent countries.

The relationship between colonialism and ethnic fragmentation is understandable. Much of the time the colonizers were not looking to create long-term lasting structures and institutions, but instead were looking for extraction of resources from these areas. This approach benefits from exploiting the differences between groups, such that the individuality of factions were more pronounced and conflicts between groups more probable (Kolo, 2011). More pronounced differences and gaps between these groups, fostered the idea that they must compete with each other for resources. This same scenario is seen with ethnic fragmentation and its effect on health and healthcare. If groups are in competition with one another for health resources, it ends with inequity in the distribution of these resources. Furthermore, if there is a large separation between groups, often there is a hierarchy that exists. With this hierarchy when one ethnic group is in

charge, there are disproportionalities with their distribution of resources, and the other ethnic groups are excluded (Lange *et al.*, 2021). Therefore, large ethnic fragmentation results in health and healthcare infrastructure of unequal and lower quality.

Similarly, the relationship found between colonialism and regime type is also understandable. Colonialism created a system where the colonists have an immense amount of power and are the sole holders of this power. When the colonists left and the countries gained independence, a vacuum of power was created, such that whoever grabbed the mantle quickest had the foundation of an authoritarian regime already structured into the country. However, if colonists established any form of election, even for only minor roles, this set up the foundation for a more democratic independent country (Lee & Paine, 2024). Colonization created the founding structures for the newly independent regimes to build on, thus, explaining the findings and results for this section of the research. Additionally, the relationship found between regime type and health also has a clear conceptual justification. With authoritarian regimes, there is a level of power and control that makes it easy and beneficial for the regime to prioritize and privilege certain groups over others. They only need to satisfy the needs of those who are valuable and necessary for them to remain in power and can exclude the others. This creates disparities between groups in the population, with some having access to quality health services, and others having little or no access (Wigley & Arzu, 2011). This type of separation with have's and have-not's is also a replication of the structure seen between colonizer and colonized. With this context, the results found in this research conform with the previous understandings of this relationship.

Lastly, the case study done with the Democratic Republic of the Congo provides an in-depth examination of the relationship between colonialism and health, through the mechanism of resource extraction. The DRC is a typical case that exemplifies this theory and can be replicated

with other countries as well. An essential part of colonialism involved resource gathering as being a primary drive to colonize these countries. As seen with the DRC, the wealth and resources that Belgium was able to gain with the goods from the DRC was extensive. Colonizers would occupy territories to get essential commodities at a very low price. This was a large motivation for European colonizers to expand their empires. The relationship resulted in the extraction of resources by rich countries creating poorer health and healthcare in the exploited countries. Even though the colonizers are not officially in charge anymore, they still continue to influence the independent countries. The systems that the colonizers set up for extraction of resources were not changed or taken away once the country became independent. Rather, a new person or group or foreign country took charge of these extractive practices and continued the exploitation and exporting of resources. The previous colonizers depend on these countries for their resources, so they would not want to lose this access. The push by these countries to extract and export causes lasting and continuous negative impacts to the people in these countries (Hickel *et al.*, 2022). The workers in these countries are working in horrible conditions that are dangerous for their health. Along with this, those in power making money from exporting these resources are not using the money to improve their country's healthcare. Lastly, the degradation of the environment creates additional health problems for those living and working in the country.

This study is subject to limitations. Firstly, a limitation to my research may come from the gaps that exist in the data set. The data set is structured so that for every country, all the years of their independence are listed. For some countries their independence began in the 19th century, so they have hundreds of years listed, while other countries became independent more recently, so they have approximately seventy years listed. This large range of years results in many gaps in

the available data for some of the variables, especially for colonies that became independent in the 1800s. For many of the explanatory variables and dependent variables, there is absent or inconsistent data that does not include early colonization years. This period was before modern data collection, so there is no easy remedy for this limitation. For the years that are more recent but still have missing data, there is the possibility of finding other researchers' data with the same or similar variables and using them to fill some of the gaps. This would involve very meticulous and time-consuming work but could be done to remedy some of these gaps. While I believe this missing data may show new trends that existed during these years or some potential outliers, I do not believe that this missing data would drastically change the outcomes of the research.

From this research, there are other potential follow-up research studies. For colonization, this research took a broad approach by looking at colonization as a monolith, but there are specifics that could be evaluated further. For example, there is analysis that could be done by separating the investigations by colonizer, or geographic location, to see if these specific aspects influence health and healthcare. Furthermore, while the DRC case study fits well for this research, this could be expanded to other countries. This increase in the number of case studies could open new areas of research and create solidified generalizable claims.

VIII. Conclusion

The findings from this study illustrate not only that there is a relationship between colonization, health, and healthcare, but it clarified the causal mechanisms as well. Through the intervening and explanatory variables of ethnic fragmentation, regime type, and resource extraction, the independent and dependent variables are shown to have a correlation. Colonization seems like something of the past, but it created foundational structures that were not dismantled but built upon. Therefore, even if it has been a long time since a country gained

independence, the effects of its colonial past can still be seen. When it involves something as valuable as the quality of health and healthcare, finding the factors that led to worse population health and healthcare access is important and can be used to make improvements. With the specific variables that were found to impact health/healthcare in this study, those can be used to tackle these issues and improve the well-being of people in these previous colonies. This sort of illumination of what exists at the foundations of inequality can become a significant catalyst for ensuring a healthier future for these countries.

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