The Influence of Democracy on Malaria in sub-Saharan Africa

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ABSTRACT

Malaria forms a severe health challenge in sub-Saharan Africa. Various attempts have been made to combat the disease, but none have succeeded. To understand why this is the case, it is essential to research what political factors can contribute to eradicating malaria. Previous research has claimed that democracy has a positive influence on health outcomes. Nevertheless, very little is known about the causality between democracy and its influence on malaria. This thesis aims to close this gap by answering the following research question: Are democracies better at handling malaria than non-democracies? Several linear regressions are done to test different democratic mechanisms, following the electoral accountability-, public goods- and political trust theory. The overall research findings show a positive but small and insignificant effect on the influence of democracy on malaria. Thus, this thesis does not provide evidence that suggests that democracies are better at handling malaria compared to non-democracies.

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INTRODUCTION

Malaria is considered to be one of the world's leading health challenges. Snowden and Bucala (2014) argue in their book that malaria is a significant contributor to global misery, decease, underdevelopment, and poverty. Annually over a million people die from malaria, and even more experience severe symptoms. Most malaria cases are reported in the world's poorest areas (Worrall, Basu & Hanson, 2005). Sub-Saharan Africa (SSA) carries the biggest burden of the public health challenge that malaria poses due to its tropical and subtropical climate in which the mosquitos can reproduce (Health Desk, 2021).

The global concern caused by malaria can be found in the sustainable development goals (SDGs) set up by the United Nations. SDG target 3.3., contains the total elimination of malaria, which is argued to be feasible with the proper medication and malaria control measurements (United Nations, 2021). Therefore, it is necessary that more is invested into preventative measures, something democratic regimes are arguable more likely to do than non-democratic regimes (Templin et al., 2021). To explore this claim, it is essential to gain a deeper understanding of, amongst others, political factors influencing the process of the elimination of malaria. This thesis focuses on democracy as a political factor.

Currently, and in the past few decades, it has been challenging to combat malaria in democratic- and non-democratic states due to limited resources and socioeconomic instability in regions where malaria occurs. Malaria control strategies are mainly aimed at prevention; however, countries only sometimes can finance the proposed preventative measures. To illustrate, insecticide-treated bed nets are extremely costly to provide for an entire population, as is the case with medication. Logically, it is not always feasible for developing countries to provide these. Due to the economic challenge that countries with malaria face, malaria is recognized as a disease of the poor (Worrall et al., 2005). Most SSA countries are dependent on the funds provided by developed countries. This dependence on developed countries that emerges due to the relationship between malaria and poverty makes the eradication of malaria politicized (Parkhurst, Ghilardi, Webster, Snow & Lynch, 2020). In addition, many domestic challenges pose a big challenge to the fight against malaria. Such as the abuse of malaria funding and resistance to commonly used methods to combat malaria. Kouyaté and his colleagues (2007; Guyant et al., 2015) wrote that after the increasing resistance to chloroquine, which was during the 90s and 00s considered the most effective and affordable malaria drug, other drugs have been

developed. However, as beautiful as new drugs sound, these drugs are not always available for the whole population due to high costs, short supply and/or a defective distribution network. Next to the use of medicine, there are also other possibilities for citizens to protect themselves against malaria, such as bed nets. Despite the availability of these bed nets, citizens often do not use them because they are unaware of the benefits. In short, enough ways to combat malaria exist, but it still is a major health threat in SSA (Oladipo et al., 2022).

Some countries are better at handling malaria than others, often because of political factors such as corruption and compliance. These factors are directly linked to political regimes, which makes it relevant to examine this. As mentioned earlier in the introduction, this thesis focuses on the influence of democracy. The relevance of examining the influence of democracy on malaria can be found in previous research. Previous research findings suggest that democracy and health are positively correlated (Besley & Kudamatsu, 2006; Franco, Álvarez-Dardet & Ruiz, 2004; Ortiz-Ospina, 2019; Ruger, 2005; Safaei, 2006). Moreover, Chang (2020) recently argued that democracy could reduce malaria mortality rates, claiming that the provision of health services to the general public is actively influenced by democracy. Nevertheless, research also proves the opposite (Fujiwara, 2015; Ross, 2006; Van der Windt and Vandoros. 2017).

This thesis aims to contribute to the discussion of whether democracy positively affects health outcomes by examining the relationship between democracy and the mortality rate of malaria in SSA. It is relevant to make this contribution because the underlying mechanisms explaining the relation between these two variables are still unknown (Franco et al., 2004). Next to these reasons, the research is also essential because there is rarely anything written on the effect of democracy on malaria in sub-Saharan Africa, which makes the disease, compared to other diseases, understudied (Ippolito & Robinson, 2022). In addition, sub-Saharan Africa is a good region to conduct additional research on the relationship between democracy and its impact on malaria because of the high prevalence of malaria cases and the variety of regime types.

This thesis explores three different theories, the electoral accountability-, the public goods- and the political trust theory. The theories are tested as a potential underlying mechanism of the relationship between democracy and malaria death rates. This is done by building a dataset using different data sources to run analyses using quantitative methods. The results of the analyses answer the research question of this thesis: *Are democracies better at handling malaria*

than non-democracies? The research results provide no evidence to argue that democracies are better at handling malaria compared to non-democracies.

CONCEPTUALIZATION OF DEMOCRACY

So far, scholars have adopted various conceptualizations of 'democracy'. For this reason, it is important to define democracy. Democracy can be defined as constitutional, substantive, procedural or process-oriented (Tilly, 2012). Looking at different definitions, they generally share the following points: a democracy is characterized by competitive elections in which the rules are clear in advance and do not benefit any group or individual above another (Tilly, 2012). In addition, democracy must promote equality among all eligible citizens in all aspects. These three points mentioned by Tilly (2012) fall into the substantive- and procedural approach. The substantive approach is centralized around the political and social conditions that a regime supports, such as social equality, open debate, and individual freedom (Tilly, 2012). The procedural approach focuses on governmental practices mostly centred around elections (Tilly, 2012). Instead of Tilly, Chai (2022) says that the substantive approach focuses on the quality of governance, while the procedural approach focuses on the way of governance. Since the political theories presented in the theoretical framework of this thesis centre around political competition and rights, a procedural approach is employed. In other words, the conceptualization of democracy used in this thesis, is characterized by the focus on whether eligible voters are free to elect representatives in free elections and the competition that ensues.

THEORETICAL FRAMEWORK

Various scholars have argued that democracies provide better health care, invest more in health care and are healthier than countries that do not stand under democratic rule (Besley & Kudamatsu, 2006; Franco, Álvarez-Dardet & Ruiz, 2004; Ortiz-Ospina, 2019; Ruger, 2005; Safaei, 2006). This research presents and tests three political theories that stand at the foundation of this claim. All theories provide a different explanation for the effect of democracy, which makes it valuable to discuss them all. The theories argue that democracies have more electoral accountability, provide more public goods, and have more political trust, which arguably has a positive effect on combatting malaria. These theories are explained and connected to malaria in this section.

Electoral accountability

Electoral accountability enables the voter to punish or reward incumbents for their political choices and performance by giving them their vote or not (Papadopoulos, 2010). This relation between citizens and those in positions of authority who use power to govern on their behalf, is a crucial element of democracy (Warren, 2017). Due to this, consensus exists around the claim that democracies have higher electoral accountability than non-democratic regimes. The accountability mechanism is strong in democracies because the regime is built on elections where people can express their vote and thus re-elect or not re-elect their leaders. Meaning there is a level of accountability within the system. In non-democratic systems, it is harder to reach this level of electoral accountability and thus punish or reward incumbents (Boas & Hidalgo, 2019). Nevertheless, examples of accountability exist, such as the emergence of accountability in China (Meixi, 2019). Meixi (2019) argues that even under authoritarianism, accountability innovations can take place, depending on external factors such as the possibility for mobilization. However, in this case, electoral accountability is not a key element for the political system to function, in contrast to a democratic system. Consequently, the opportunity to punish the government in non-democratic regimes is smaller.

Within the theory of accountability, the relationship between the people and those in power often is placed within the framework of a principal-agent game. In this game, an individual, group or institution (principal) can punish or reward the government (agent) (Warren, 2017). Nevertheless, this way of thinking has been criticized for simplifying the process (Warren, 2017). However, it offers a good opportunity to apply the theory in a straightforward way to malaria; one can argue that due to the higher level of accountability of democracies, they implement more successful measures against malaria than non-democratic regimes. Because if the people in power do not act in line with the public's interest, the people eligible to vote can punish them for failing to combat malaria. The opportunity this democratic mechanism offers can influence action taken against malaria and, thus, indirectly affect the population's health. For instance, previous research shows that more electoral accountability is linked to less corruption, which is identified as a challenge when it comes to combatting malaria (Kohler & Bowra, 2020).

An important pre-condition for this mechanism is that information regarding a politician's political choices, and performance is available. The free press plays a critical role in democracies in this respect (Freedom House, n.d.). The mobilization function of the media influences people's

political participation and the chance that people hold politicians accountable for their actions, because people who are well informed on an issue are more likely to act upon it (Santas & Ogoshi, 2016; Ward, 2011). Some scholars have even argued that citizens should consider the issue salient enough to hold the government accountable for their performance (Boas & Hidalgo, 2019). The role of the free press would become even more important when following this theory. Boas and Hidalgo (2019) point out that endemic diseases are generally considered less salient; therefore, getting people to take preventative action is more challenging.

People's perceptions of risk are subjective. Moreover, a new and unknown condition may be less harmful than an existing health threat while still being viewed as a more severe threat. Since malaria is an endemic disease, the risk perception is low following this line of argument. In reality, people do consider malaria as a significant health threat, as different studies suggest (Abdullahi, A. A., Van Zyl-Schalekamp, & Seneka, A., 2013; Okello-Ogojo, 2001). As a result, the theory of whether people consider malaria 'salient' is still contested. Therefore, ideally you want to include the percentage of people that consider malaria ‘salient’ enough as a control variable. Unfortunately, this data is not available. Moreover, whether the theory of electoral accountability is applicable is also under discussion (Boas & Hidalgo, 2019). To contribute to the discussion and test this democratic mechanism, hypothesis 1 is proposed:
Hypothesis 1 – Countries with more electoral accountability have a lower malaria mortality rate.

Public good provision

Research has shown that higher electoral accountability of democracies results in the provision of more public goods compared to non-democratic regimes (Bättig & Bernauer, 2009; Deacon, 2009; Lake & Baum, 2001; Rosenzweig, 2015). Due to electoral accountability, as explained above, it is logical that democratic governments are more likely to respond to the needs of the people. Deacon (2009) explains this by demonstrating the different motivations for public goods provision between a democracy and a dictatorship. He argues that incumbents in a democratic regime want to satisfy a large fraction of the population. Also referred to as the median voter (Black, 1958; Bowen, 1943; Downs, 1957). The underlying assumption of this theory is that politicians desire to be re-elected and therefore try to satisfy eligible voters. Investing in public goods is a good way to do this, due to the economies of scale inherent in supplying a public good to a larger population (Bättig & Bernauer, 2009).

In contrast, in a dictatorship, the political power is concentrated in smaller influential political groups or individuals (Deacon, 2009). Therefore, the budget is usually spent to benefit these smaller parties. There are better ways to win the support of this smaller group than the provision of public goods since other non-influential parties will also have the opportunity to use it. Deacon's (2009) argument shows that the decision to invest or not to invest in public goods depends on whether it results in political support. The argument of Lake and Baum (2001) corresponds with Deacon's argument in a way that they claim that the provision of public goods involves a trade-off between public goods and political support. In addition, Bättig and Bernauer (2009) support this claim by arguing that democracies have a bigger motivation, due to electoral accountability, to provide public goods than non-democratic countries. Also, Rosenzweig (2015) claims that more electoral competition will lead to better public goods outcomes. In short, scholars have argued that a positive correlation between democracy and the provision of public goods exists (Deacon, 2009; Baum, 2001; Bättig & Bernauer, 2009; Rosenzweig, 2015).

Within the field of healthcare, healthcare itself is not considered a public good because it does not meet the two properties that need to be met for something to be a public good. Accordingly, public goods should be non-rivalrous and non-exclusive, and health care does not meet these demands (World Health Organization, 2002). However, knowledge related to health, such as learning to recognize symptoms and link these to an infection, is considered a public good.

Knowledge is considered a public good because if you share knowledge with someone, you continue to enjoy the same level of knowledge as yourself, and there is zero marginal cost to the other person using it to their advantage (Sanacore, 1999). This is valuable information because research shows that knowledge is an important predictor of whether individuals do or do not follow health measures concerning malaria prevention (Adongo, Kirkwood & Kendall, 2005; Bortel, Barutwanayo, Delacollette & Coosemans, 1996; Kanyangarara et al., 2018; Krezanoski, Tsai, Hamer, Comfort & Bangsberg, 2014). Therefore, it is valuable to examine the theory of public goods in relation to the posed research question of this thesis.

The effect of knowledge is illustrated by Krezanoski et al. (2014). They found a positive relation between malaria knowledge and an increased probability of household insecticide treated bed net ownership. Insecticide treated bed nets are a well-known preventative measure people

can take against malaria. In addition, Kanyangara et al. (2018, p. 12) state that "high levels of knowledge about the causation, transmission, prevention and treatment of malaria may facilitate changes in attitude, resulting in the adoption of positive preventive practices that reduce the risk of exposure to malaria and contribute to decreased malaria transmission.".
The spread of knowledge is mainly done within schools and other institutions related to education. Generally, it is argued that democracies offer more education than non-democratic states (Dahlum & Knutsen, 2017). This claim is tested utilizing hypothesis 2:
Government education spending influences the causality between democracy and malaria deaths in a way that if the democracy increases, the malaria deaths decrease.

Furthermore, you could argue that more preventative measures against malaria are used in democratic states because more education is offered. Therefore, the theory of public goods in this thesis will be tested as a possible democratic mechanism by means of the following hypothesis:
Hypothesis 3 - Within democratic states, a higher percentage of the population uses insecticide treated bed nets than in non-democratic states.

Political trust

Political trust, or rather political distrust, challenges malaria prevention and elimination in sub-Saharan Africa. Political trust is essential for the willingness of citizens to comply with health care advice. The concept of political trust is conceptualized as "a citizens' support for political institutions such as government and parliament, in the face of uncertainty about or vulnerability to the actions of these institutions" (Van der Meer, 2016, p. 1). Therefore, it is argued that higher political trust can be associated with more (health) policy compliance (Bollyky, Angelino, Wigley & Dieleman, 2022; Busemeyer, 2022; Widaningrum, 2017; Shanka & Menebo, 2022). Citizens' compliance is vital to combat malaria because specific measures are proven to be highly effective in lowering infection rates, such as using vaccinations and bed nets. Therefore, the political theory of political trust is relevant to the research question.

To illustrate the effect of political trust, Bollyky and his colleagues (2022) point out in their research that citizens are more likely to follow government guidance on COVID-19 measures, such as mask-wearing, if they consider their government trustworthy. Shanka & Menebo (2022) also found a correlation between political trust and compliance with COVID-19

measures. To add, scholars from Brown University (2016) found that citizens who distrust government institutions are more likely not to follow disease-control measures, which negatively influences public health.

In short, compliance with health guidelines determines whether populations will succeed in combatting and preventing malaria. In addition, the degree to which people trust the government plays a huge role because it decides how likely people are to follow health recommendations. Even if these recommendations might be uncomfortable, like sleeping with a mosquito net. Much research about the COVID-19 crisis proves this, but also results from research on the Ebola pandemic and the H1N1 pandemic confirm these results (Shana & Menebo, 2022). Due to the strong relationship between political trust, compliance and health results, one can argue that it is desirable for a country to have high political trust.

In general, it is argued that democracies enjoy more political trust than non-democratic systems, especially if they have been in place longer for the democratic institutions to develop further (Warren, 2017). In addition, China and Singapore are an exception to the rule. Badmos and his colleagues (2021) argue that most SSA countries lack governmental support, which is a precondition for successful malaria control, as pointed out above. Besides, (democratic) sub-Saharan African nations often lack the human resources, medical products, and services needed to provide quality healthcare (Badmos et al., 2021). Malaria control is typically inadequate due to this, even though it is argued that democracies provide more health care than non-democracies (Ortiz-Ospina, 2019). To explore whether the causality between trust and malaria mortality holds within SSA, where the circumstances are often rather challenging, the following hypothesis is proposed:

Hypothesis 4 – The malaria mortality rate is lower in countries with higher political trust. Next to testing the democratic mechanism of public trust, this hypothesis also contributes to the relatively understudied field of political trust in authoritarian regimes (Rivetti & Cavatorta, 2017).

The influence of democracy on people's health

One, however, must be critical and wonder whether a higher provision of public goods, higher governance accountability and more political trust will also increase people's health. Van der Windt and Vandoros (2017) build their argument upon the accountability- and public goods theories and investigate whether democracies offer better health services than non-democracies. However, the research result of their case study in Congo shows no effect between democracy and better health care. The scholars explain this by pointing to the fact that in order to improve health services, there need to be certain resources present. These serve as a condition in order to find the effect. For instance, in their case study, there is no infrastructure, which explains why no effect was found. The findings of this research are not generalizable since the results are based on one case study.

Another study that does not support a positive correlation between democracy and healthcare is conducted by Ross (2006). He shows that there is no correlation between democracy and lower child- and infant mortality in Africa. To follow up on this, Fujiwara (2015) points out that even if there are resources available to invest in health care, it is not self-evident that this will also lead to better health care. This is the case because there are a lot of external factors that influence the success of investments, such as the presence of corruption and the availability of skilled staff.

Other studies, however, have found a positive effect between health and democracy (Besley & Kudamatsu, 2006; Franco, Álvarez-Dardet & Ruiz, 2004; Ortiz-Ospina, 2019; Ruger, 2005; Safaei, 2006). Besly and Kudamatsu (2006) show with their research that countries with democratic institutions have a great life expectancy, and Ruger (2005) claims that the absence of democracy forms a threat to a population's health. He demonstrates this with a case study on China's famine of 1958-1961. Furthermore, Franco and his colleagues (2004) found a positive relationship between health and democracy after controlling for a country's wealth, level of inequality and the size of the public sector. Overall, these study results show that there is no consensus on whether democracy positively influences the quality of healthcare. As stated before, this thesis contributes to the discussion on whether democracy has a positive or negative effect on health, with malaria as the central topic.

Previous research findings mainly argue in favour of a positive influence of democracy. In this thesis, this side of the argument is tested with the earlier presented hypotheses. These hypotheses come together in the research question of this thesis: *Are democracies better at*

handling malaria than non-democracies? In line with the three theories presented in this section, it is expected that democracies are better at handling malaria than non-democracies. This research translates this to the assumption that a higher level of democracy corresponds with a lower malaria death rate, leading us to the following hypothesis (hypothesis 5) for the research question: *democratic countries have a lower malaria death rate than non-democratic countries.*

METHODOLOGY AND DATA

The relationship between malaria death rates and democracy will be tested through a multiple regression analysis using data from 2018, and a fixed effects regression using longitudinal data. The results of this multiple regression analysis will show whether a correlation exists between the dependent and independent variables tested. More precisely, the model will show if there exists a positive or negative relationship between the tested variables by indicating by what value Y will change if X increases with a single unit. This model is used for a cross-sectional analysis to test hypotheses one and four.

We perform a fixed effect regression using longitudinal data for hypotheses two, three, and five. This analysis enables us to test how the level of democracy influences the malaria mortality rate spanning several years within one country. This is possible because, for our democracy index variable, the malaria death rates variables and the control variables, data for several years is available. The analysis is done by making dummy variables for each state and adding these to the regression, together with the democracy index variable, malaria death rates variables and the control variables. The model excludes Angola as a reference category to avoid multicollinearity problems. By doing this analysis, a better answer to the research question can be provided, compared to if you would just run the test for one year. The results show whether a relationship between democracy and malaria death rates exists within one country over several years, and if so, if the effect is negative or positive.

The combination of the fixed effect regression and the linear regression enables us to test all the proposed hypotheses.

The multiple regression analysis and the fixed effect regressions cover data from 48 sub-Saharan African countries over ten years. Two factors drive the concentration on SSA: Firstly, SSA is the region most severely affected by malaria; around 90% of all malaria cases are confirmed in the region annually (Snow & Omumbo, 2006). Secondly, the region has a wide

range of democratic and non-democratic administrations (Freedom House, n.d.). This is due to the uneven African democratization wave in the 1990s. In this period, African states either made or did not make the transfer to a democratic regime (Schmitter, 1993). There are some success stories, like the swift from a dictatorship to a multiparty democracy in Benin. However, the period is also known for its setbacks and stories of (political) violence, such as Rwanda's human rights crisis (Schraeder, 1995). Thus, the combination of the high level of malaria cases and the variation between regime types makes sub-Saharan Africa an excellent region to conduct an additional study on the relationship between democracy and its effect on malaria.

Unfortunately, not all sub-Saharan African countries can be included in testing all hypotheses and not for all the variables is the data included for more than ten years due to the availability of the data.

It is important to point out that a significant result is not a guarantee for causality. Meaning that if a correlation between the variables malaria death rates and democracy exists, there will need to be a plausible explanation of what mechanisms causes this relation. The presented political theories in this paper serve as potential causality mechanisms. The theories are also tested in the statistical model explained below. Besides providing a plausible explanation for the potential correlation between malaria death rates and democracy, it is also essential to secure as much as possible that confounding and extraneous variables are not causing the found effect. This can be done by adding control variables. This way, the internal validity increases, which means that conclusions drawn from the statistical results can be regarded as more accurate and reliable.

The rest of this section discusses the dependent-, independent-, and control variables included in my dataset. The data used to test the hypotheses is collected from various data sources and manually merged into one dataset.

The dependent variable

The primary dependent variable, the malaria mortality rate, is withdrawn from the Institute for Health Metrics and Evaluation. The data on the mortality rate from 1991-2019 is categorized by age group and part of the 2019 Global Burden of Disease (GBD) study (Institute

for Health Metrics and Evaluation, n.d.). In the dataset, I created a new variable in which I added all the different age categories up and divided this number by the total population, followed by a multiplication of 10.000. This way, the variable is easier to interpret. This new variable shows how many people passed away as a consequence of malaria per 10.000 people. The data on the total population is withdrawn from the World Bank Database (The World Bank, n.d.). *Table 1* shows the descriptive values of the dependent and independent variables of all the countries and years included in the database. For this variable, the mean is 8.412 (SD 7.29), and the highest value of 30.1 deaths per 10.000 inhabitants belongs to Sierra Leone.

The primary independent variable

The main independent variable is 'democracy'. Out of the different data sources available to measure how democratic a country is, I have chosen the Freedom House Index. Despite the critique that this index is very simplistic, I consider it a good fit for this research. Because the index considers the substantive- and procedural criteria for a democracy, which are mostly called upon in conceptualizations of a democracy (Nwogu, 2015; Tilly, 2012). Just like in the conceptualization of democracy within this thesis. Also, the criteria match the posed research question due to the focus on whether citizens can influence governmental policy. Next to this, the Freedom House data was easily accessible because you can download the data from their website for several years without a license.

The Freedom House index is always included as an independent variable in the data model. This score is an interval measure on a scale between 0 (least democratic) and 100 (most democratic). Within the rating, three different levels of democracy can be distinguished: Free, Partly Free and Not Free. The score shows the average of its political - and civil rights freedom scores, based on the answers to 25 questions in total. There are 10 questions to measure the degree of freedom on the political rights dimension and 15 questions to measure freedom on the civil rights dimension. Each question is worth between 0 and 4, and all the answers add up to 40 and 60 points. The combination of the scores decides in which category – Free, Partly Free or Not Free - a country falls (Freedom House, n.d.).

Because it takes some time to notice the effect of democracy on malaria, we used a delay of five years in the year we test the effect of democracy. For instance, if one looks at the relationship between democracy and malaria mortality in 2014, the value of the Freedom House

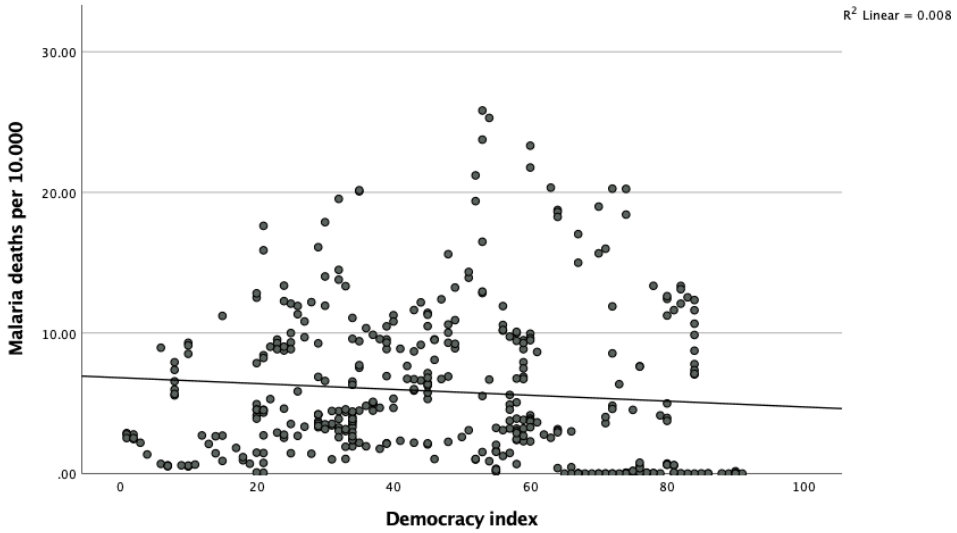
Index from 2009 is used for the variable democracy. By doing this, the risk of reverse causation is limited.

The dataset includes data for the years 2006-2019 from 48 countries. The Freedom House Index has a mean of 47.59 (SD 23.93), this score falls into the 'partly free' category. Somalia's data contains the lowest rating (1, Not Free), whereas Mauritius has the highest value (91, Free).

Hypothesis 5

The data on democracy and the malaria mortality rate is used to test, amongst others, the fifth hypothesis and is visible in *Figure 1*. Looking at the graph, you can see that the data varies across countries. Where the democracy index increases, the malaria deaths per 10.000 have multiple values of 0. Nevertheless, there are also higher values noticeable in the graph in a place where the democracy index is relatively high (>60). Furthermore, the linear line of best fit shows that the overall relationship is negative. However, the effect is very weak.

Figure 1



Scatterplot on the democracy index of a country and the malaria mortality rates

Hypothesis 1

The first hypothesis concerns the relationship between government transparency, accountability, corruption and the malaria mortality rate. Next to democracy is another independent variable included in the analysis, which considers government transparency,

accountability and corruption (called *Transparency Accountability and Corruption Index*). These factors influence the extent to which politicians can be held accountable. According to the literature review, it is expected that democratic countries score higher than non-democratic countries. The scores vary between 1 (low accountability) and 6 (high accountability). Important to point out is that transparency, accountability and corruption levels have equal weight in calculating a country's accountability score. The data is withdrawn from the World Bank Database (World Bank, n.d.).

Hypothesis 2

The second hypothesis includes the democracy index as the independent variable and malaria mortality as the dependent variable. A variable showing the government expenditure on education as a percentage of the total government expenditure is included as a control variable. This way, the potential influence of education expenditure on the causality between democracy and malaria mortality rates can be detected. The data for this new control variable was collected by UNESCO through their annual education survey. However, the data itself was withdrawn from the World Bank Database (n.d.) of the years 2013-2019.

Hypothesis 3

Additionally, hypothesis three is tested by checking the correlation between the use of insecticide-treated bed nets and the level of democracy. Insecticide-treated bed nets are proven to be the most effective and used method to combat malaria (Abdullahi et al., 2013; Bortel et al., 1996; Kanmiki et al., 2019; Toé et al., 2009). Therefore, it can be argued that levels with a high percentage of use of bed nets probably score better in reducing malaria than countries in which the bed nets are not used at all (Kanmiki et al., 2019).

The dependent variable 'Use_of_bed_nets' shows how many per cent of the children under the age of five slept under an insecticide-treated bednet. The data is collected by The World Bank (n.d.) from several data sources: UNICEF, State of the World's Children, Childinfo and the Demographic and Health Surveys. No data is available on Cape Verde, Lesotho, Mauritius, Seychelles and South Africa. This does not directly form an obstacle to the analysis but can affect the generalizability of a potential effect. Furthermore, in Table 1 can be noticed that the values differ per country, with the lowest value of 0.6, or 0.6%. The highest value of

95.5, this means that 96% of children under the age of 5 slept under an insecticide-treated bed net the night before the survey.

Hypothesis 4

The fourth hypothesis tests the correlation between political trust and the malaria mortality rate. For 31 countries, information on political trust is filtered out of the survey research conducted by the Afrobarometer (Afrobarometer, n.d.). There is no data for Angola, Burundi, Central African Republic, Chad, Comoros, Congo Republic, Democratic Republic of Congo, Eritrea, Eswatini, Ethiopia, Equatorial Guinea, Guinea-Bissau, Mauritania, Rwanda, Seychelles, Somalia and South Sudan. Just like for hypothesis three, this does not form a barrier to the research. This may impact how generalizable the research findings are.

Out of the available result summaries of the surveys conducted on an individual level, the average is taken of the people that 'somewhat' or 'a lot' trust the ruling coalition/party or, if this information is not available, the parties of the presidential movement. The percentage in the dataset overall thus reflects how much people trust a main political organ implementing policy. The data comes from the seventh round of surveys, which means the data was published in either 2017 or 2018. This is the most recent data that falls into my dataset. Table 1 shows a wide variation between countries, but the overall trust is below 50%, which confirms claims around low trust demonstrated in this thesis.

Table 1. Descriptive statistics of the dependent and independent variables

	Mean	SD	Min	Max	N
Malaria Mortality	8.40	7.29	0.00	30.01	1386
Freedom House Index	47.59	23.93	1.00	91.00	419
Transparency Accountability and Corruption Index	2.70	0.64	1.50	4.50	269
Political Trust	43.23	13.00	14.99	64.00	31
Use of Bed Nets < 5 years	36.99	22.57	0.60	95.50	199

Control variables

For all hypotheses, there is a certain amount of control variables added. As mentioned before, adding control variables to a statistical model is important to limit the influence of confounding and extraneous variables on your model. This is done in this thesis by adding in five control variables. The control variables are added based on previous research and research results. Due to the size of this research, there could be added in a limited number of variables. Nevertheless, the most important control variables are included because the selection includes well-known control variables within political science, such as a country's gross domestic product (GDP). Besides, the included variables have a clear theoretical relevance.

Firstly, a country's primary education completion rate is added because, according to research, a person's education level and knowledge of malaria influences the level of governance compliance with health measures (Bortel et al., 1996; Kanmiki et al., 2019; Kanyangarara et al., 2018; Pooseesod et al., 2021). In addition, the level of education can also influence the degree to which people support a democratic regime (Alemán & Kim, 2015). The data is withdrawn from the World Bank Database (n.d.) for 1991-2019. Secondly, the control variable government expenditure, which is already discussed on page 16, is added in. This variable is different from the first one in a way that government investments do not automatically lead to people attending school. Thus, government investments do not necessarily tell us about the education levels within a society. However, this control variable enables us to test hypothesis two, as mentioned before.

Thirdly, to control for a country's economic growth, gross domestic product (GDP) is added as a control variable for the years 2013-2019 because one can argue that more prosperous societies have more resources to combat malaria (Croke, 2012). The data source is the World Bank Database (n.d.), and the data is added and calculated in natural log. This is done because the assumption of linearity is met via the logarithmic scale.

Fourthly the percentage of the country with a tropical climate is included in the variable Tropical_Climate. This variable is included because malaria thrives in a tropical climate (Ashley, Pyae Phyo & Woodraw, 2018). Therefore, one can argue that countries with a tropical climate have to do more against malaria than countries that do not have this characteristic, and climate might also influence the prospects for democracy. The data is matched with the data used in the

research performed by Chang (2020). Because we assume that the effect of climate change on a country's climate is evenly distributed and minimal for the time period analyzed in this thesis, the same data is used for 2009-2019.

Lastly, the availability of insecticide treated bed nets is included as a control variable. Because the use of insecticide treated bed nets influences the success level of malaria control. This control variable is specific to hypothesis three, in contrast to the other control variables. By controlling for the availability of bed nets, it is possible to test the influence of democracy with regard to hypothesis three. The data is collected via the website of the World Health Organization (n.d.) and shows the percentage of people who have access to an insecticide-treated bed net for malaria.

RESULTS AND DISCUSSION

In *Table 2* the results of the fixed effect regressions and the linear regression, which were conducted to test the presented hypotheses, are presented. Within the tables, different models are presented, which are connected to the hypotheses presented in this thesis. For models 1 and 4 data from the year 2018 is used and to test models 2, 3, 5, and 6, longitudinal data is used. For the tests the following assumptions were checked: if there is no multicollinearity, no autocorrelation, linearity, no heteroskedasticity. In addition, the statistical model was controlled for outliers, influential cases and a normal distribution of errors. For all the models it became clear that all the assumptions for a linear regression were met, except for the linearity test. Furthermore, none of the models are statistically significant, only the constant value and control variables show some significant outcomes. In this section the meaning of the statistical output is discussed by means of the output in table 2.

Hypothesis one

In table 2 (on the next page) the results from two OLS regressions and 4 fixed effect regression are reported. In model 1 the causality of the independent variables: democracy index and electoral accountability, on the independent variable: malaria mortality rates, is tested (in the year 2018). We see that none of the independent variables have a significant effect on the malaria mortality rates. It is however important to point out that a higher democracy index and more

electoral accountability causes an increase in malaria deaths. This is contradictory to hypothesis one: *Countries with more electoral accountability have a lower malaria mortality rate.* Moreover, one control variable shows a significant effect – tropical climate – meaning that this control variable has some effect on the independent variables. Overall, can we conclude that this model does not provide any findings that support hypothesis one and therefore we fail to reject the null hypothesis of no effect.

Hypothesis two

To test if the causality between democracy and malaria deaths is affected by education spendings, the variable 'expenditure education' is added in as a control variable. The results of the fixed effect regression in model 2 show that the direction and significance of the democracy index does not change. Meaning that if the democracy index increases with one unit, the malaria mortality rate decreases. In addition is the effect of education spendings not significant on the statistical model. Only the control variable 'education completion rate' is significant, meaning this control variable has some effect on the dependent variable (β=-0.580, $p<0.05$).

If we draw these implications back to the *Hypothesis 2 – Government education spending influences the causality between democracy and malaria deaths in a way that if the democracy increases, the malaria deaths decrease.* We fail to reject the null hypothesis of no effect, because the role of the expenditure on education appears to be irrelevant. Meaning that this specific model does not provide any evidence for the theory of public goods to influence the causality between democracy and malaria deaths.

Hypothesis three

Secondly, model three shows the causality of democracy's effect on the use of bed nets (dependent variable). As it is argued that the use of bed nets is a highly effect measure against malaria, this test is indirectly connected to the malaria mortality rate of a country over time.

The results suggest that the effect of democracy is positive. Because if the democracy index increases with a value of 1, the percentage of children under the age of 5 sleeping under a mosquito net increases with 0.12 percent. It should be noted that the effect is very small and that the effect is not significant. In model three only the control variable 'education completion rate' is significant and thus has some effect on the dependent variable (β=1.132, $p<0.05$). Additionally,

it is important to note that the control variables 'tropical climate' and 'the availability of bed nets' were included in the regression. However, the effects were so small, SPSS did not provide any results.

Table 2. Results OLS regression and fixed effect regression

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Constant)	6.484	8.490	-83.433	-14.451	3.898	16.499*
	(12.105)	(9.054)	(175.656)	(12.595)	(2.051)	(7.675)
Freedom House Index	0.008	-0.055	0.123	0.031	-0.007	-0.007
	(0.060)	(0.029)	(0.407)	(0.058)	(0.026)	(0.025)
Transparency Accountability and Corruption Index	2.088					
	(2.409)					
Political Trust				0.022		
				(0.083)		
Tropical Climate	0.065*	0.050		0.055		
	(0.029)	(0.021)		(0.030)		
GDP	-0.872	0.137	6.352	-2.074		-1.047
(Natural Log)	(2.147)	(1.438)	(20.550)	(1.937)		(0.886)
Education Completion Rate	-0.069	-0.580*	1.132*	-0.004		0.082***
	(0.087)	(0.027)	(0.445)	(0.123)		(0.022)
Expenditure Education		-0.040				
		(0.048)				
Access to Bed Nets						
Country fixed effect		Yes	Yes		Yes	Yes
R^2	0.399	0.939	0.693	0.442	0.916	0.921
Adj. R^2	0.126	0.919	0.386	0.163	0.899	0.905
N	17	170	71	16	266	266

Note: OLS regression and fixed effect regression, coefficients with standard errors in brackets.

The reference category is Angola for the fixed effect regression.

The dependent variable is malaria deaths per 10.000 people for models 1, 2, 4, 5 and 6. For model 3 is the use of bed nets the dependent variable.

****p < 0.001, **p < 0.01, *p < 0.05*

In summary, there is no evidence provided to accept hypothesis 3: *Within democratic states a higher percentage of the population uses insecticide treated bed nets, than in non-democratic states.* We thus fail to reject the null hypothesis of no effect.

Hypothesis four

The results in model 4 show the outcomes of an OLS regression conducted to test the fourth hypothesis: *The malaria mortality rate is lower in countries with higher political trust.* Just like the other models, does model 4 not provide any significant independent variables. Furthermore, the effect is the opposite from what we would expect. Because an increase in the democracy index and political trust ensures an increase in malaria deaths. In short, does one model 4 not provide any supportive findings for hypothesis four and we thus fail to reject the null hypothesis of no effect.

Hypothesis five

These models 5 and 6 provide an answer to hypothesis five: *Democratic countries have a lower malaria death rate than non-democratic countries.*
In model 5 solely the relation is tested between the malaria mortality rate and the democracy index, and in model 6 the control variables are added in. The control variable 'tropical climate' was also added into the syntax, however because the effect was so small SPSS did not include the variable in the coefficients table.

The direction of the effect of the democracy index is not a significant predictor of the variation of malaria mortality over time. However, we do see that the direction of the effect is in line with the hypothesis. Because the β- value is negative, meaning that if the democracy index increases, the malaria morality rate decreases. More precisely, if the democracy index increases with 1, the malaria deaths per 10.000 persons decreases with a value of -0.007. Meaning that if democracy index increases by one and the malaria deaths will be 16.499-0.007, if on average the control variables are all equal to zero.

With regards of the significance of the models; model five does not show any significant results. In model six solely the control variable 'education completion rate' is significant ($\beta = 0.082$, $p<0.001$). meaning that this variable has some effect on the dependent variable. Also, the constant is significant. The value of the constant (the value of the malaria mortality rate per

10.000 people) in this model is 16.499. This value is the average malaria mortality rate when the democracy index is equal to zero. The significance of the constant unfortunately tells us very little and because the independent variable does not show a significant result, the overall model provides us with no evidence to support the fifth hypothesis: *Democratic countries have a lower malaria death rate than non-democratic countries.* Therefore, we fail to reject the null hypothesis that states that there is no statistically significant effect.

To close off, from the results of the fixed effect regressions and the OLS regressions one can conclude that there is no evidence provided that enables me to argue that democracies are better at handling malaria than non-democracies.

CONCLUSION

Malaria is considered a threat to public health, especially in developing countries. Several attempts have been made to combat the disease, but until now, none have succeeded in eradicating malaria. Previous research has shown that political factors can play a decisive role in how successful taken measures against malaria are. This thesis examined whether democracies are better at handling malaria than non-democracies. Previously the influence of different political processes was examined, which are directly linked to different kinds of regimes. However, research on the influence of democracy on malaria was not yet or minimally conducted. Therefore, the results of this thesis are crucial to close this research gap and directing prospective policy on counteracting malaria in the right direction.

The overall findings show a positive but small and insignificant effect for the influence of democracy, with regards to the longitudinal data. Meaning that an increase in democracy causes a decrease in malaria deaths, also if a control variable for governance education expenditure is added. Moreover, is an increase in the democracy index also connected to a higher percentage of the population that uses insecticide treated bed nets. However, for the cross-sectional analysis an opposite effect was found. Meaning that if a country's accountability or public trust increases, malaria deaths also increase. From the research results we can conclude that not enough evidence it provided to argue that democracy positively influences malaria death rates. Therefore, we fail to reject the null hypothesis of no effect. Furthermore, the research results do not align with the electoral accountability – public goods- and public trust theory presented in this thesis. To

provide a direct answer to the research question: *Are democracies better at handling malaria than non-democracies?*, this thesis does not provide evidence that suggests that democracies are better at handling malaria compared to non-democracies.

There are possible explanations that could account for this effect. Generally, as mentioned in the theoretical framework, it is argued that democracy positively influences health care. There are, however, some cases that argue that the positive effects of democracy, like less corruption and more accountability, have minimal effect to not an effect at all. Using this as a starting point, you could speculate that democracy might have a small effect on malaria because the knowledge of people focused on malaria is lacking which causes for a decrease in trust. Or people are simply not motivated enough to hold incumbents accountable due to external factors, falling outside of this research. Findings such explanations, is something that future research can focus on.

Moreover, the rejection of the null hypothesis does not imply that there is no effect. Due to the small size of the dataset, there may be a small effect that we could not detect. Another limitation of this research is the lack of data for all the variables. To illustrate, due to the limited availability of data for the control variables, fewer countries could be included in the statistical tests, making the research outcomes less generalizable. Also, it is unfortunate that for only some of the variables, longitudinal data were available. This way, there is no complete consistency in the statistical tests. Besides these limitations, the results do form a meaningful contribution to the mentioned research gap and discussion on the influence of democracy on health, specifically on malaria outcomes. Primarily because the analyses are predominantly conducted with longitudinal data, we can say something meaningful about the causality between democracy and malaria over the years. These findings can be used for further research focusing specifically on sub-Saharan Africa that is explicit to the causality between democracy and malaria outcomes or between democracy and health outcomes in general.

To conclude, more research must be conducted on the relationship between malaria and democracy due to the research gap. For future research, it is recommended to use a more extensive dataset to detect a possible minor effect between democracy and malaria deaths. In addition, future research should reveal the causes of the (lack of) effect and examine whether the research outcomes, concerned with malaria and democracy are restricted to sub-Saharan Africa.

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