# The Influence of Subnational Democracy on the Level of Public Health: A Case of Nigeria

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Does democracy increase the level of public health? The positive influence of democracy on the level of public health has been widely studied. Yet, related to developing countries, only few research empirically examined this relationship. With the subnational data on the number of under-5 mortalities per 1,000 live births in Nigeria from 2000 to 2020, this article using ordinary least squares (OLS) regression models demonstrates that subnational democracy leads to a higher subnational level of public health. In addition, we find that, if a president and a state governor have the same party affiliation, inter-government cooperation is facilitated and, in turn, it is translated into a higher subnational level of public health. More interestingly, this relationship is strengthened by the subnational democracy.

# I. Introduction

Does the subnational democracy increase the level of subnational public health? The low level of public health is a severe problem not only in developing countries but also in developed countries. Especially, African countries have suffered from public health problems because of the long history of exploitation from Western countries and low economic development. There are several efforts to attain a higher level of public health in African countries, such as mimicking the public health system of Western countries. However, most of them go down the drain. Even though many scholars try to find the essential pretexts for a higher level of public health, African countries are still under the veil because of data scarcity and there is still no consensus about which factors affect the level of public health.

This article tests the influence of subnational democracy on the level of public health. The role of democracy in development including public health is widely studied. However, it is not well studied under the situation of uneven democracy widely spread in developing countries. Under uneven democracy, some states have a democratic system while others have not. By comparing those states in a country, we try to find the impacts of subnational democracy on the subnational level of public health. We open the academic black box of influences of subnational democracy by focusing on Nigeria. There are several reasons why we choose Nigeria as a case. Nigeria has variations in the level of subnational democracy and public health among states, and Nigeria is one of the biggest and most influential countries in Africa. Moreover, Nigeria has still suffered from severe public health problems.

## Ⅱ. Literature Review

Public health has recently gained scholarly attention as one of the most important components of development. Sen(1999) laid the groundwork for such a trend. His "capabilities" approach defines development as the process of expanding "substantial" freedoms to "avoid such deprivations as starvation, undernourishment, escapable morbidity, and premature mortality, to be literate and numerate, and to enjoy participation and uncensored speech" (Sen 1999, 24). He includes public health as one of the main constitutive components of development in the sense that factors which cause unfreedom including poverty, tyranny, and systematic social deprivation should be eradicated to achieve development.

Contrary to the debate over the relationship between economy and democracy, research on the influence of democracy on public health shows a coherent result. Several studies have investigated how democracy influences public health. Most studies have shown a positive correlation between levels of democracy and public health outcomes based on analyses that pool a broad range of countries and time periods. Public health has been conceptualized from two perspectives: individual-health outcomes and health policy. The former indicators include life expectancy and infant mortality (Veenstra & Patterson 2015), while the latter includes public investment in health care (Klomp and De Haan 2009).

Both types of public health are associated with democracy. Besley and Kudamantsu (2006) find that life expectancy at birth and other health policy outcomes (immunization, sanitation, clean water, and health spending) are dependent on the consolidation of democracy measured by the permanent democratic status after 1956, based on the panel data across countries from the 1960s to the 2000s. More recently, Patternson and Veenstra (2015) show that checks and balances, competitive political participation, and the number of years a democratic regime has

been in power drive the correlation between democratic status and better health conditions by generating substantial advantages in promoting life expectancy and improving infant health.

However, these studies are short of confirming the influence of democracy on public health. Due to the varieties of country effects and confounders associated with both levels of democracy and public health indicators, their cross-country analyses could face criticisms on their methodological issues that endogeneity and confounders are not adequately addressed. The national economy indicated by average income or socioeconomic modernization and urbanization strongly correlate with both improvements in public health and democracy (Sen 1999). Furthermore, most statistical models in previous literature have employed do not adequately address autocorrelation issues even when they use multiple-year data and have suffered from a lack of robustness.

## Ⅲ. Theories and Hypotheses

Given the shortcomings of cross-national analyses explained above, a new approach is needed. Our study suggests that a test focusing on subnational levels can be a better way to examine the influence of democracy on public health. Subnational analyses have received scant attention in the political science literature on public health, although subnational levels have advantages in controlling national-level confounders. Shared national contexts by subnational units clear the need to control different cross-national settings. Subnational contexts are advantageous to study how democracy influences public health, a research topic which is likely to suffer from methodological problems in cross-national analyses.

Studying this topic can exploit heterogeneous political settings that are frequently

observed within newly democratized and developing countries. What our study particularly focuses on is "uneven democracy" where authoritarian practices persist in part of a country ("brown areas" in O'Donnell's term (1993)). The degree of democracy is not evenly dispersed from jurisdiction to jurisdiction within a national territory. Such uneven democracy is not uncommon in the developing world.

The incipient uneven democracy literature has explored countries with diverse political regime landscapes under various themes. For instance, Gibson (2005) looks to the strategic behavior of authoritarian leaders to perpetuate their provincial non-democratic regimes in nationally democratic countries. Local elite leaders in "authoritarian enclaves" isolate themselves from the democratic center under circumstances where the center cannot or does not pay attention to peripheries, as in several Latin American countries. Such subnational heterogeneity is possibly likely to shape how policies are differently implemented across subnational units and provide opportunities to investigate the influence of democracy on public health. However, few previous works have investigated this relationship empirically, although both types of the political system at the country level and decentralization of governance generate different policy outcomes. Our study is thus an attempt to shed new light on a linkage between subnational politics and development.

To build a hypothesis about the relationship between subnational democratic political system and public health, this article following Cheibub and Przeworski (1999) measures democracy by focusing on the alternation of power of the state governors and competitive elections (or multiparty elections). The focus on competitive electoral system and the alternation of power has been widely employed to measure democracy in the literature on African Politics (Harding 2020; Theisen et al. 2020). Based on this rather minimalist definition of democracy, we expect that states with a subnational democratic political system where competitive electoral processes and alternation in power among multiple parties exist can enjoy a higher

subnational level of public health.

The main reason behind this expected relationship is that voters have alternatives and can punish governors who do not pay attention to the subnational public health. The probability of not being re-elected urges state governors to put efforts on the subnational level of public health. Moreover, democracy has checks and balances, and a higher level of accountability rather than a non-democratic political system. Brinkerhoff(2004) categorizes three types of accountabilities existing in the democratic political system: reducing abuse, assuring compliance with procedures and standards, and improving performance and learning. He emphasizes improved accountability as the element for improving health system performance. In addition, Rütten et al. (2003) argue that concrete goals, enough resources, and public support are the determinants for behavioral change on the public level to increase public health. Furthermore, they find that personal commitment and organizational capacities which are higher under a democracy rather than a non-democratic system are related to the health policy implementation process by delving into the role of policy and evidence in health promotion.

On the contrary, subnational states or provinces where competitive elections do not exist cannot fully enjoy the positive outcomes produced by democracy. Elections in those subnational areas are not competitive and always one political party holds power and authority. The lack of electoral competitiveness can cause a negative influence on the outcome of public health policies. There are several possible stories about this. Foremost, people in undemocratic subnational areas do not fully experience democracy yet. They experience only a dominant party system and do not experience democratic practices such as electing other politicians from a different political party. This lack of democratic experiences of public makes politicians insensitive to public opinions and public health policies. The incentives of politicians to implement successful public health policies descend because the

costs of public health policies do not change but the benefits of successful public health policies decrease. Second, there are no alternatives. Even though there are elections that people can use to punish poor achievements of public health policies, voters cannot find alternatives in undemocratic subnational areas. The lack of alternatives again gets rid of politicians' incentives to implement public health policies enthusiastically. Based on the mechanisms above, the following hypothesis will be tested.

*Hypothesis 1: Subnational democracy increases the level of public health, while all other things being equal (Ceteris Paribus).*

In addition to the above hypothesis about the influence of the undemocratic subnational political system, this article investigates how the subnational level of public health changes if a president and a state governor are from the same political party. Under a political system with elections and a two-term presidency such as Nigeria, the primary goal of presidents and state governors is to be re-elected. To increase the probability of re-election, both presidents and governors tend to put their efforts into public goods provisions to attract voters. Given that the success of the provision of public goods for public health depends on both federal and state governments, the cooperation between those two different levels of government is important.

The influence of intergovernmental political cooperation has been proven for decades (Coleman 1999). Coleman(1999) shows that party responsiveness tends to be improved under the condition of political cooperation between governments. Based on the ground-breaking previous works, we argue that if a president and a state governor are from the same political party, it boosts cooperation which can improve the subnational public health. Political parties' approval rates can benefit

individual governors to be re-elected, because voters not only consider individual candidates but also political parties. Therefore, individual governors have incentives to help other governors from the same political party. Thus, if the federal leader and the state governor are involved in the same political party (i.e., if there is a local-center political alignment in terms of the identical partisanship of the federal leader and the state governor), the two governments elaborate together on providing public goods to people to increase approval rates and the probability of re-election. Therefore, we test the following hypothesis.

*Hypothesis 2: The local-center political alignment in terms of the identical partisanship of the federal leader and the state governor increases the subnational level of public health, while all other things being equal (Ceteris Paribus).*

Lastly, the conditional relationship between the influence of the same party affiliation and the democratic subnational political party system is examined. The influence of the same party affiliation of a president and a state governor can be augmented by a subnational democratic political party system. Under a non-democratic subnational party system, there are no alternatives for people to elect and previous governors or governors from the same political party tend to be re-elected without a political effort as mentioned previously.

Thus, the same party affiliation of a president and a state governor does not pay more attention to this kind of state. Rather, central and state governments from the same political party cooperate more with democratic states because voters can choose other candidates from other political parties. As a result, the influence of the same party affiliation of a president and a state governor on the provision of the public good about public health is higher when it is related to democratic states than to non-democratic states.

*Hypothesis 3: The influence of subnational democracy on the subnational level of public health is augmented by a local-center political alignment in terms of identical partisanship of the federal leader and the state governor, while all other things being equal (Ceteris Paribus).*

# IV. Empirical Analysis

## 1. Nigeria As a Case

We choose Nigeria as a case to test the hypotheses based on several reasons. First, Nigeria is one of the largest countries in Africa. Nigeria is even treated as a regional hegemon. Its population continuously increases and now it goes over 190,000,000 million. Nigeria experienced fast economic growth based on exportation, domestic savings, and the oil industry (Kilby 1969). The GDP of Nigeria surpassed that of South Africa in 2011. These characteristics of Nigeria make Nigeria a good subject to be studied because other countries tend to learn from the powerful countries and imitate or refer to various successful policies.

Second, Nigeria is a good example of studying the influence of uneven democracy. After democratization in 1999, Nigeria implemented a three-tier government system. There are 36 states and one federal capital territory, Abuja, and 774 local government areas. After democratization and the adoption of a national-wide election with broad suffrage, Peoples Democratic Party (PDP) dominated national and state-level elections. The opposing parties have to serve as alternatives, but they were weakened by PDP's overt and covert strategies (Dode 2010). From 1999 to 2014, the presidents of Nigeria all came from PDP. Finally, Muhammadu Buhari from All Progressives Congress (APC) won over Goodluck

Jonathan and Nigeria experienced a peaceful power transition. Unlike the presidential election in Nigeria, some states such as Akwa/Ibom, Bayelsa, Benue, and Cross River do not experience a power transition of governors through an election. The short history of democracy and absence of power transition at the state level make us possible to study the influence of democracy on public health, while controlling the national level of confounding factors.

Lastly, there are lots of accessible and valuable subnational panel data about Nigeria relative to other African and developing countries. Moreover, subnational variations in the outcomes of public health policies among 36 states and Federal Capital Territory exists over time, which enables us to conduct statistical analysis.

## 2. Data and Variables

Due to the lack of data, many articles focus on the countries outside of Africa. Moreover, even though they can get data about a country in Africa over time, it is still very hard to get subnational government data such as public health data on each state in a country. It should be noted that some previous studies based on the Demographic and Health Surveys have conducted individual-level analyses about the link between public health and democracy (Harding 2020; Theisen et al. 2020). Although those attempts have broadened our understanding of the relationship between public health and democracy, there is still an academic void related to the association between state-level public health and democracy. This article overcomes this limitation by dealing with the state-level Under-5 Mortality data of Nigeria from 2000 to 2020.

### 1) Dependent Variable

In this article, the subnational-level of Number of Under-5 Mortalities out of

1,000 data related to Nigeria will be employed as a dependent variable. To build this data, we refer Wollum et al.(2015) which construct 20 key maternal and child health (MCH) interventions and outcomes for 36 states of Nigeria and the Federal Capital Territory through an estimation method based on 19 state-level surveys in Nigeria, Nigeria's National Bureau of Statistics, and regional information about 6 geopolitical zones in Nigeria (North East, North Central, North West, South East, South South, and South West).

### 2) Independent Variables

To estimate the influence of subnational democracy and unified governments on the subnational level of public health and the interactive relationship between them, two key independent variables, Party Transition and Party Match, are constructed.

Party Transition is to capture the concept of subnational democracy. Peaceful and successful party transition is the main criterion for consolidated democracy (Linz and Stepan 1996). Based on the seminal work from Linz and Stepan(1996), a subnational political system is usually measured based on whether a subnational state experiences party transition or not.

Following this academic convention, we measure subnational democracy by using Party Transition. The lack of party transition in a state after the 1999 democratization of Nigeria means that there are no alternatives of candidates or political parties. Moreover, even though there is an alternative, some voters do not experience party transition. It prevents voters from learning and experiencing the role of democracy. In addition, a lack of party transition means that there is a dominant political party system, and it can reduce the responsiveness of state politicians. Thus, Party Transition can capture the main characteristics of a subnational political system described in the previous section. It has value 1 if a state experienced a political party transition of the governor's political party. On the

other hand, it has 0. For example, ABIA state's governors before 2007 are from PDP. On May 29, 2007, Theodore A. Orji from PPA was elected through the general election. In this case, Party Transition in the ABIA state has values of 0 before 2007 and 1 after 2007.

Secondly, Party Match is used to test the influence of unified federal and state governments on the subnational level of public health. Party Match is a dummy variable. 1 is assigned if the president of Nigeria and state governors are from the same political party, and the dominant political party National Assembly of the Federal Republic of Nigeria is the same. Otherwise, 0 is assigned.

### 3) Control Variables

Previous articles have found a series of factors that can influence the level of public health. Without controlling those factors, it is impossible to capture the accurate influences of subnational democracy and unified governments on the level of public health. Therefore, we include a series of control variables based on previous research: Government Health Expenditure per capita, State with Oil Production, GDP per capita, Muslim State, and Northern State.

The first control variable is Government Health Expenditure per capita. Government health expenditure is regarded as an important factor affecting the level of public health. Kim and Lane(2013) find strong evidence to support the positive relationship between health expenditure and the two public health indicators with data about 17 OECD countries from 1973 to 2000. Secondly, higher economic development of countries has been studied as the main factor leading to a higher level of public health. Swift(2011) demonstrates that the increase in GDP per capita accelerates life expectancy for most countries and emphasizes the strength of the relationship between economic development and public health.

In addition, three Nigeria's specific characteristics are controlled. Nigeria has an

oil industry and the economic situation fluctuates with the trend of the Oil price (Khan 1994). Without considering the oil industry, it is nearly impossible to totally understand and unveil the factors related to Nigeria's level of public health. If a state relies on the oil industry, its outcomes of public health policies are highly related to the status of the oil industry because it can determine the resources such as the finance of a state. Therefore, we include State with Oil Production as a control variable. We assign 1 if a state has oil production. Otherwise, 0 is assigned. Next, the activity of Boko haram is not negligible because of its adverse impacts on public health (Ekhator & Abebe 2019). We include Northern State as a proxy because Boko haram builds its base in the Northern parts of Nigeria and its activities are focused on the Northern Parts. 1 indicates Northern states and 0 denotes states not in the Northern region.

Lastly, this article controls Muslim states where the Muslim population in states reaches a certain percentage. The Muslim population in Nigeria spreads throughout all the states in Nigeria (Kilani 2000). Because of the religious characteristics of Muslims, Muslims sometimes reject receiving a series of vaccinations which leads to adverse effects on their health (Kaufmann and Feldbaum 2009). This religious-specific tendency leads to a health crisis threatening the level of public health among Muslims. To control the negative influence of Muslim states on public health, we include Muslim States as an ordinary variable ranging from 0 to 5 based on the data from the National Bureau of Statistics of Nigeria. 0, 1, 2, 3, 4, and 5 indicate that the percentage of the Muslim population in a state is 0%, 1-20%, 21-40%, 41-60%, 61-80%, and 81-100% respectively.

The independent and control variables are lagged by one year because of theoretical and methodological reasons. Theoretically, political and economic factors take time to influence the level of public health. Especially, the anticipated effects of two independent variables which are political on public health hardly appear

immediately. Methodologically, lagged explanatory variables in panel data can alleviate endogeneity problems preventing us from concluding the causal relationships with four dependent variables.

〈Table 1〉 Descriptive Table for Variables

| Variable | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|
| **Dependent Variable** | | | | |
| Number of Under 5 Mortalities | 146.873 | 46.206 | 72 | 302 |
| **Independent Variables** | | | | |
| Party Transition | 0.359 | 0.480 | 0 | 1 |
| Party Match | 0.676 | 0.469 | 0 | 1 |
| **Control Variables** | | | | |
| Health Expenditure per Capita | 13.169 | 7.482 | 3.119 | 27.329 |
| GDP per capita | 4276.816 | 926.807 | 2848.151 | 5479.058 |
| Oil Production State | 0.297 | 0.458 | 0 | 1 |
| Muslim State | 2.270 | 1.827 | 0 | 5 |
| Northern State | 0.541 | 0.499 | 0 | 1 |

## 3. Empirical Results

In this article, ordinary least square (OLS) regressions are used as the main statistical models to estimate the influence of Party Transition and Party Match on the level of subnational public health. Moreover, the inclusion of interaction terms enables us to test the conditional relationship between Party Transition and Party Match. State-clustered standard errors are estimated in every model. In addition to the OLS regressions, models with two-way fixed effects and state-clustered standard errors are estimated for robustness check.

⟨Table 2⟩ Results from OLS Regressions

| | Number of Under 5 Mortality | |
|---|---|---|
| | Without Controls | With Controls |
| **Independent Variables** | | |
| Party Transition | -27.322*** | -19.205*** |
| | (4.392) | (3.357) |
| Party Match | -19.732*** | -6.451* |
| | (5.000) | (3.011) |
| **Control Variables** | | |
| Health Expenditure per capita | | -0.670 |
| | | (0.432) |
| GDP per capita | | -0.008 |
| | | (0.005) |
| State with Oil Production | | 10.377* |
| | | (4.489) |
| Muslim State | | 13.346*** |
| | | (1.062) |
| Northern State | | 25.261*** |
| | | (4.487) |
| Constant | 170.016*** | 152.611*** |
| | (5.162) | (12.345) |
| Number of Observations | 740 | 740 |
| R-sq | 0.093 | 0.598 |
| adj. R-sq | 0.089 | 0.593 |
| AIC | 5395.753 | 4983.471 |
| BIC | 5408.503 | 5017.471 |

Note: * $p<0.05$, ** $p<0.01$, ***$p<0.001$. State-clustered standard errors in parentheses. The Akaike's Information Criteria and the Bayesian Information Criteria are presented for the model comparison.

Table 2 presents the empirical results from OLS regressions without control and with control variables. Several consistent findings clearly emerge throughout the

models. First, Party Transition is statistically significant across the two models at the level of p<0.001. It means that if a state experiences party transition through a democratic election, the number of under 5 mortalities per 1,000 decreases by 27.322 and by 19.205 in models without and with controls respectively. Second, Party Match is also statistically significant. Under the condition of the same party affiliation of a president and a state governor, the number of under 5 mortalities per 1,000 decreases by 6.451. This relationship is statistically significant at the level of p<0.01. In the model without controls, such a relationship is also statistically significant at the level of p<0.001 in a negative direction.

A series of control variables except for Health Expenditure per capita and GDP per capita are also statistically significant with the expected direction. States with oil production and with a higher percentage of the Muslim population, and northern states are negatively associated with the subnational level of public health. Those results about control variables confirm the findings from the previous articles. Beta coefficients of Party Transition and Party Match provide empirical evidence for hypothesis 1 and hypothesis 2. Moreover, both variables are not only statistically significant, but also substantially significant in terms of the size of coefficients.

〈Table 3〉 Estimates of Interaction Term from OLS Regressions

| | Number of Under 5 Mortality | |
|---|---|---|
| | Without Controls | With Controls |
| **Independent Variables** | | |
| Party Transition x Party Match | -44.213*** | -22.509*** |
| | (9.459) | (7.356) |
| Party Match | -38.980*** | 4.560 |
| | (7.117) | (5.440) |
| Party Transition | -55.009*** | -5.246 |
| | (8.212) | (5.730) |

| | Number of Under 5 Mortality | |
|---|---|---|
| | Without Controls | With Controls |
| Control Variables | | |
| Health Expenditure per capita | | -0.725 |
| | | (0.435) |
| GDP per capita | | -0.008* |
| | | (0.004) |
| State with Oil Production | | 7.778 |
| | | (4.616) |
| Muslim State | | 14.911*** |
| | | (1.107) |
| Northern State | | 21.434*** |
| | | (4.593) |
| Constant | 184.684*** | 147.415*** |
| | (6.731) | (12.376) |
| Number of Observations | 740 | 740 |
| R-sq | 0.139 | 0.607 |
| adj. R-sq | 0.134 | 0.601 |
| AIC | 5370.553 | 4974.257 |
| BIC | 5387.553 | 5012.506 |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. State-clustered standard errors in parentheses. The Akaike's Information Criteria and the Bayesian Information Criteria are presented for the model comparison.

Next, the conditional relationship between Party Transition and Party Match is tested through models with the interaction term. Table 3 shows the results from the models with interaction terms. The results provide empirical support for hypothesis 3. The interaction terms are statistically significant at the level of $p < 0.001$. These results imply that the positive influence of Party Match on the subnational level of public health is magnified when a state has undergone a party transition.
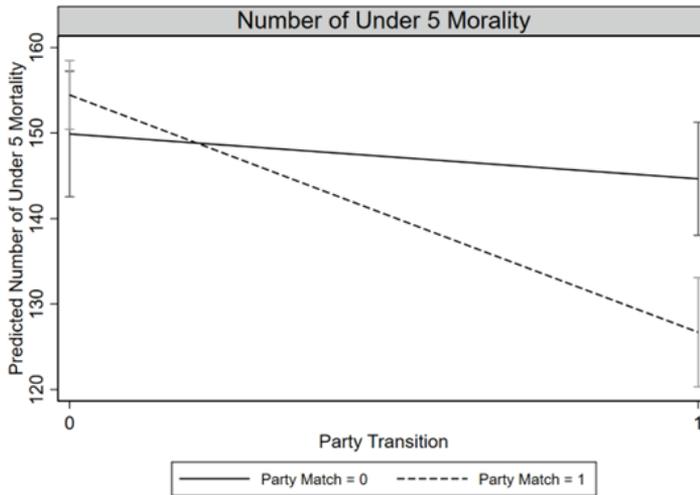
⟨Figure 1⟩ Linear Prediction based on the Interaction Term in Table 3 with 95% Confidence Intervals

To explore the substantive relationship between Party Transition and Party Match over the statistical relationship, linear predictions based on the interaction term are presented in Figure 1. Figure 1 again gives robust support for hypothesis 3. States with an experience of party transition under the same party affiliation of a president and a state governor have 18 fewer numbers of under-5 mortalities than states without the experience. The 95% confidence intervals in Figure 1 do not overlap with each other, which means that the influence of Party Match on the level of subnational public health when states experience party transition is statistically different from the influence of non-unified governments at the level of $p<0.05$. Based on the empirical results from Table 3 and the marginsplot in Figure 1, we are confident to argue that there is a conditional relationship between Party Transition and Party Match.

## 4. Robustness Check

To check the robustness of the empirical findings, we conduct additional estimations. Some might argue that there can be an omitted variable bias causing estimations of beta coefficients from models in Table 2 and 3 to be biased and inefficient. We agree with this caution. For instance, the level of political and economic corruption is not included in our main models because of the data scarcity about Nigeria especially at the subnational-level. In order to overcome such limitations and critique, we estimate the main models in Table 2 and Table 3 with year-fixed and state-fixed effects (also called two-way fixed effects). The inclusion of year-fixed effects will control the influence of unobserved and unmeasurable related to yearly changing Nigeria's national characteristics. In addition, the use of state-fixed effects enables us to parcel out the influence of subnational variables not measured in the main models.

〈Table 4〉 Results from Alternative Model Specifications

|  | Number of Under 5 Mortality | | | |
|---|---|---|---|---|
|  | Without Controls | | With Controls | |
| **Independent Variables** |  |  |  |  |
| Party Match | -8.340 *** | -8.339 *** | -3.540* | 5.332 |
|  | (2.779) | (2.788) | (1.779) | (6.728) |
| Party Transition | -8.362 *** | -8.359 *** | -2.362* | 8.465 |
|  | (2.144) | (2.600) | (1.144) | (5.600) |
| Party Transition x Party Match |  | -24.701 *** |  | -24.700 *** |
|  |  | (8.282) |  | (8.282) |
| **Control Variables** |  |  |  |  |
| Health Expenditure per |  |  | -0.640 | -0.630 |

| | Number of Under 5 Mortality | | | |
| --- | --- | --- | --- | --- |
| | Without Controls | | With Controls | |
| Capita | | | *** | *** |
| | | | (0.069) | (0.070) |
| State with Oil Production | | | 210.672 *** | 205.185 *** |
| | | | (1.184) | (3.399) |
| GDP per capita | | | -0.014 | -0.015 |
| | | | (0.011) | (0.010) |
| Muslim State | | | 57.643 *** | 57.643 *** |
| | | | (0.000) | (0.000) |
| Northern State | | | 47.261 *** | 49.011 *** |
| | | | (3.498) | (3.871) |
| State Fixed Effects | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes |
| Constant | 154.377 *** | 147.444 *** | -12.808 | -13.338 |
| | (2.873) | (5.229) | (7.877) | (7.781) |
| Number of Observations | 740 | 740 | 740 | 740 |
| R-sq | 0.675 | 0.684 | 0.721 | 0.723 |
| adj. R-sq | 0.671 | 0.678 | 0.711 | 0.721 |
| AIC | 3812.217 | 3802.877 | 3812.217 | 3802.877 |
| BIC | 3875.967 | 3870.876 | 3875.967 | 3870.876 |

Note: * $p<0.05$, ** $p<0.01$, ***$p<0.001$. State-clustered standard errors in parentheses. The Akaike's Information Criteria and the Bayesian Information Criteria are presented for the model comparison.

Table 4 shows the empirical results from the models estimated with state- and year-fixed effects and with state-clustered standard errors. As presented the Party Match and Party Transition are statistically significant in the models estimated without the interaction term. Even though the estimated coefficients of those two

variables are decreased from those in Table 2 because of the fixed effects, Party Match and Party Transition are confirmed to decrease the Number of Under 5 Mortality. Moreover, the interaction terms between Party Match and Party Transition in the models with two-way fixed effects and state-clustered standard errors are statistically significant at the level of $p < 0.001$.

To sum up, we confidently conclude that subnational democracy is positively associated with the subnational level of public health. Also, the same party affiliation of a president and a state governor tends to increase the subnational level of public health. In addition, the conditional relationship between those two independent variables is also supported by the empirical results. The influence of the same party affiliation is magnified if states underwent party transition through elections. Those relationships are substantively as well as statistically significant.

# Ⅴ. Discussion and Conclusion

Several important empirical findings and implications emerge from our analysis. First, our empirical findings cast optimistic lights on the positive correlation between the democratic political system and the subnational level of public health. The importance of these findings is that the influence of subnational democracy is not only limited to only developed countries, but also can be applied to developing countries, which has not been tested because of a lack of data about the subnational level of public health. Also, this article emphasizes the importance of the subnational approach to test the influence of democracy.

Second, our study contributes to the literature about the inter-governmental cooperation between federal and state governments by showing that the same party affiliation of a president and a state governor facilitates inter-governmental

cooperation to provide public health. This contribution suggests that inter-governmental cooperation, dynamics, and politics widely studied in the U.S., and other European countries also can be applied to developing countries where political institutions are not strong enough compared to advanced countries.

Lastly, this paper urges the need to put academic attention to the conditional relationship between democracy and other characteristics of political institutions by demonstrating the influence of the same party affiliation of a president and a state governor on the subnational level of public health varies according to the subnational democracy. This implication is in line with the recent academic approach to finding a series of conditional factors on democracy (Jensen and Skaaning 2015).

Ultimately, the above findings and implications are robust and consistent across different model specifications including fixed effects and panel corrected standard errors. However, our analysis should not be considered an absolute conclusion. Even though subnational analysis enables us to control the national level factors and a series of models are estimated for robustness check, this article only deals with a short time of period from 2000 to 2020. For future studies, expansion of the number of countries with uneven democracy is needed to conclude the relationships studied in this article. If various subnational data will be available in the future, it will be also promising to directly examine the impacts of the multiple measures of subnational democracy, local level margins of electoral victories, and local-center coethnicity with additional independent variables on the subnational level of public health.

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