

# Institutional Quality: A hurdle or a catalyst to eliminating energy poverty in sub-Saharan Africa?

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# Energy Poverty and the Sustainable Development Goals

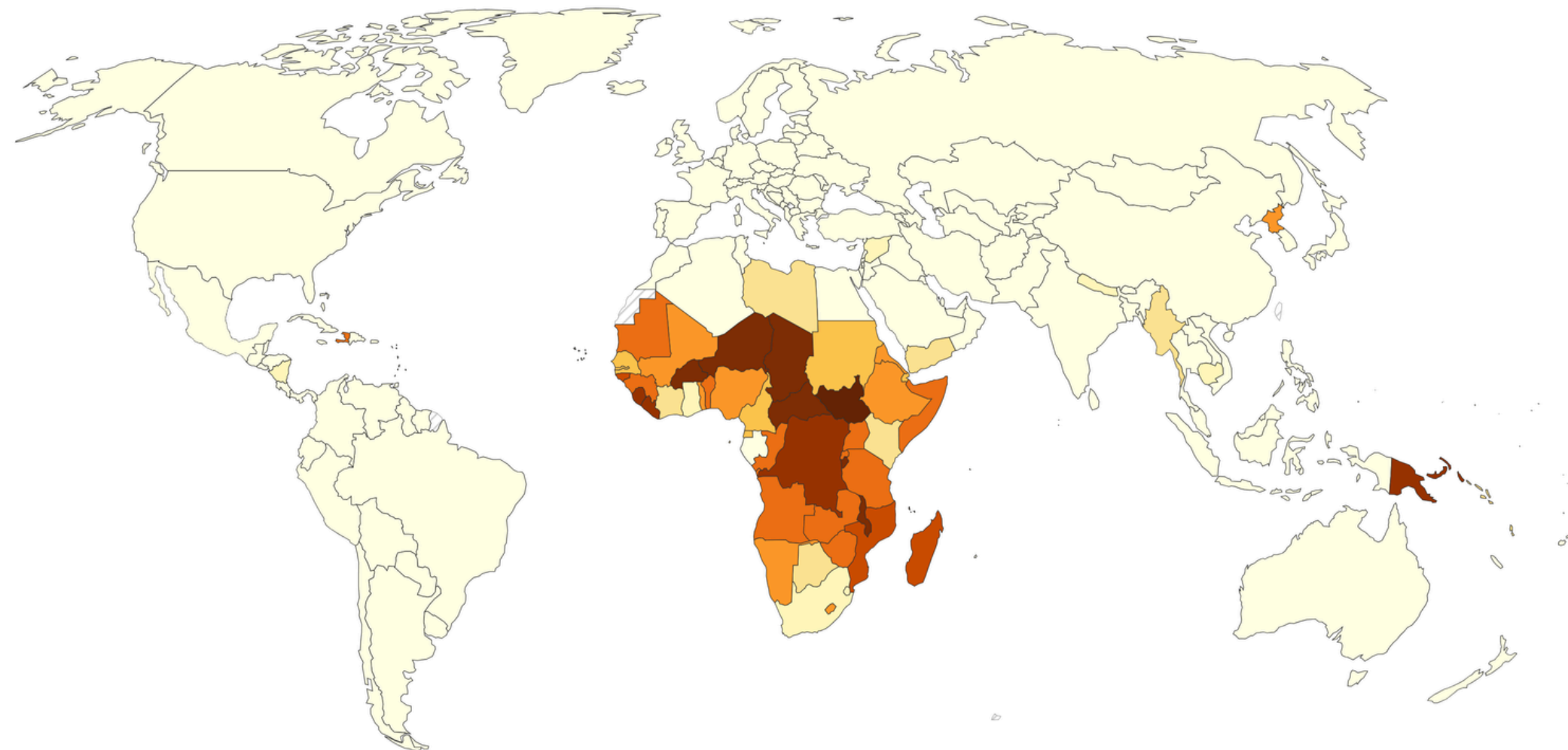


# The Case for Sub-Saharan Africa

## Share of the population with access to electricity, 2021

Our World  
in Data

Having access to electricity is defined in international statistics as having an electricity source that can provide very basic lighting, and charge a phone or power a radio for 4 hours per day.



Data source: Data compiled from multiple sources by World Bank

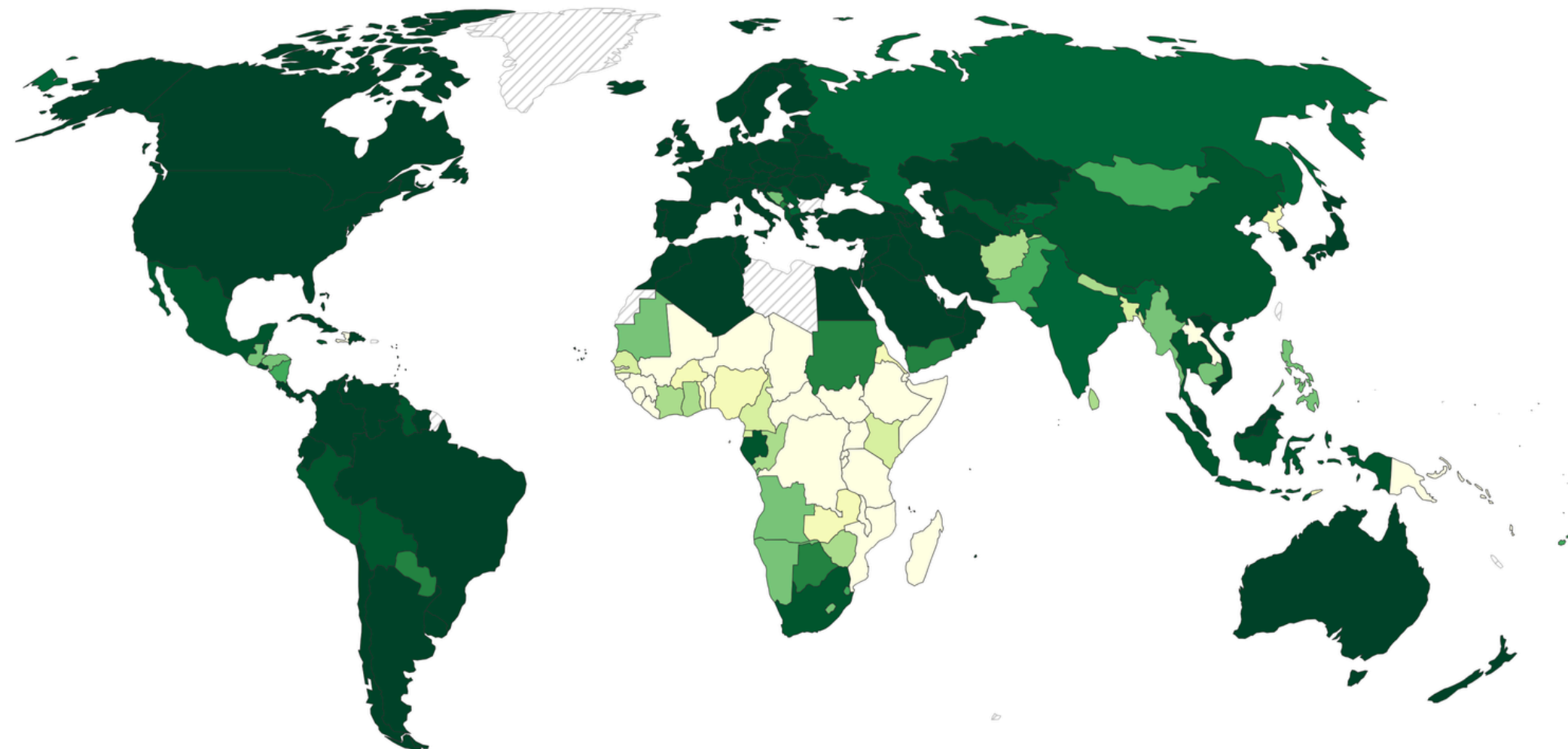
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# The Case for Sub-Saharan Africa

## Share of the population with access to clean fuels for cooking, 2021

Access to clean fuels or technologies such as natural gas, electricity, and clean cookstoves reduces exposure to indoor air pollutants, a leading cause of death in low-income households.

Our World  
in Data



Data source: World Health Organization - Global Health Observatory (2024)

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# Research Focus

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- Despite significant economic growth, many Africans still lack access to essential services (Adom et al., 2021).
- Africa has vast renewable energy potential and critical minerals for the energy transition (Filho et al., 2024).

## Research Question:

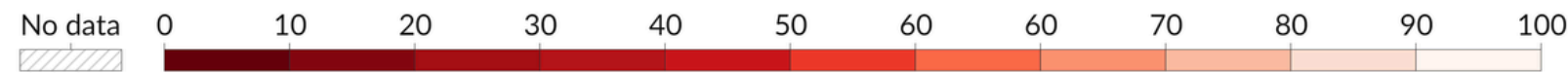
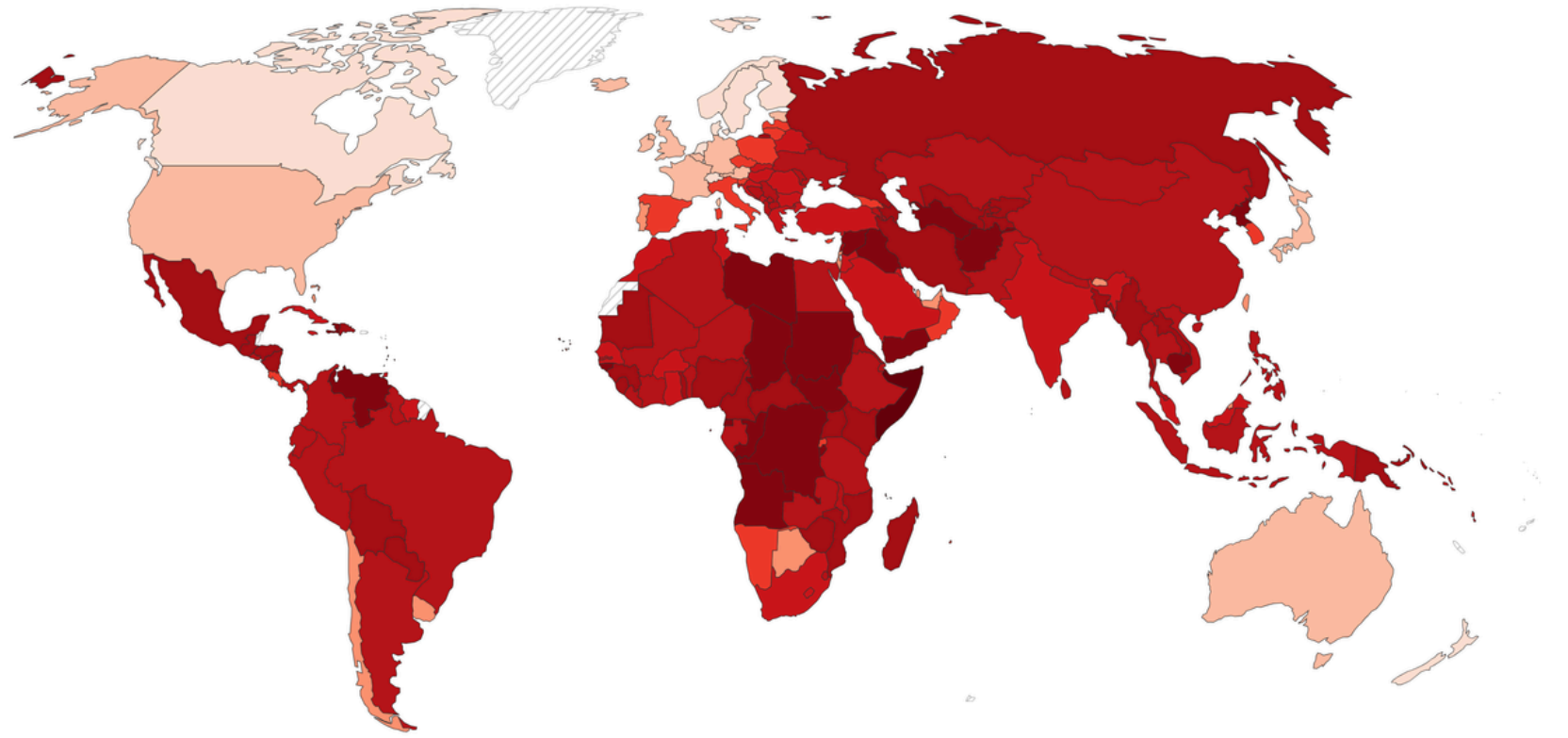
**How does institutional quality influence the progress toward eliminating energy poverty in sub-Saharan Africa?**

# The Case for Sub-Saharan Africa: Institutional Quality Insights

## Corruption Perception Index, 2018

Transparency International's Corruption Perception Index. Scores are on a scale of 0-100, where 0 means that a country is perceived as highly corrupt.

Our World in Data



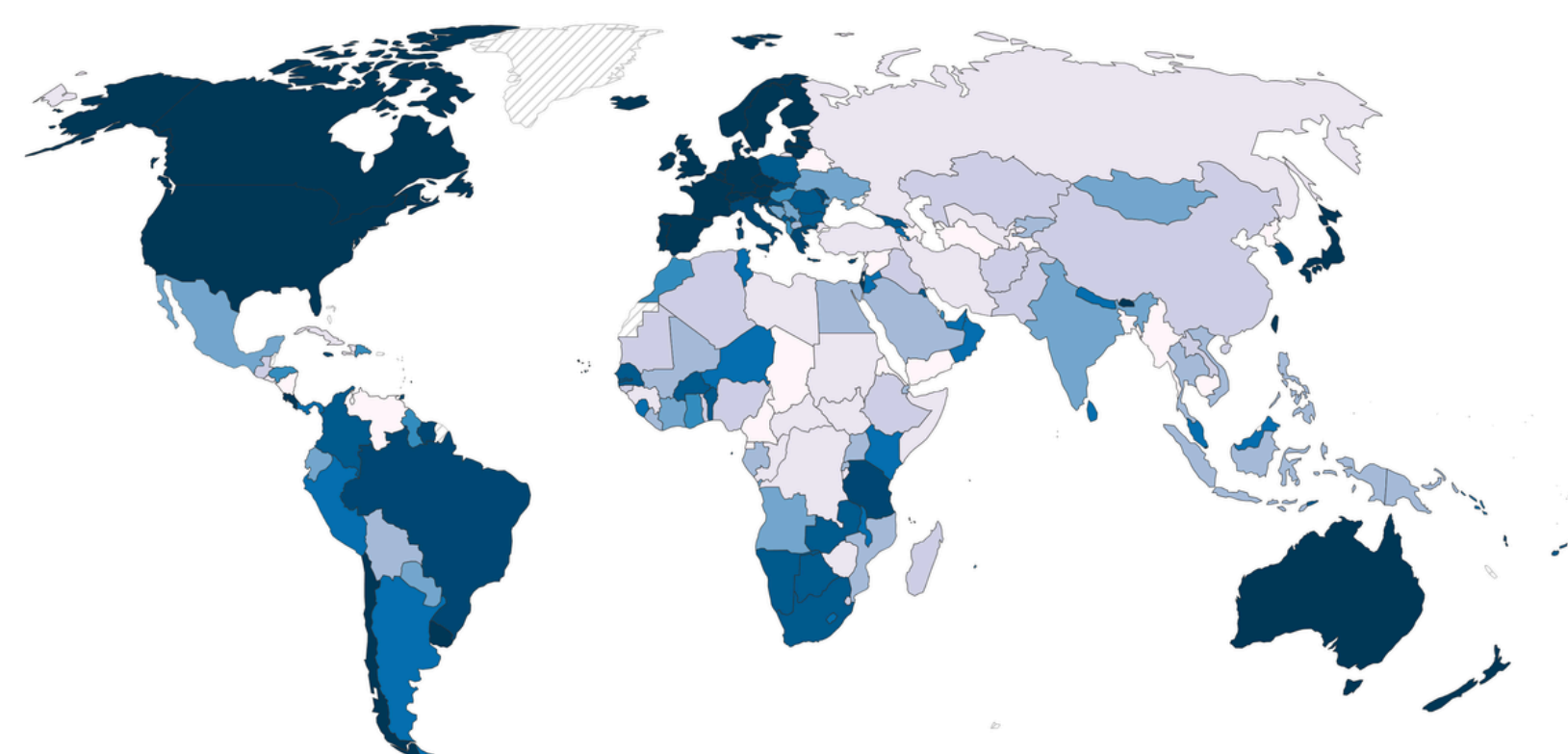
Data source: Transparency International (2018)

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## Rule of law index, 2023

Based on the expert estimates and index by V-Dem<sup>1</sup>. It captures the extent to which the government complies with the law, courts are independent, laws transparent, justice accessible, corruption absent, and the bureaucracy is impartial. It ranges from 0 to 1 (most rule-based).

Our World in Data



Data source: V-Dem (2024)

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# Literature Review

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- **Electricity Access:** Institutional quality, especially government effectiveness, strongly impacts SSA electricity access (Onyeji et al., 2012).
- **Electricity Consumption:** Institutional quality and democracy boost electricity use (Ahlborg et al., 2015).
- **Clean Cooking:** Governance improves access to clean cooking and mediates globalization and FDI effects (Acheampong et al., 2023; Aluko et al., 2023).
- **Public Expenditure:** Institutional quality enhances the effectiveness of government spending on clean cooking access (Bousnina & Gabsi, 2023).
- **Clean Cooking Gap:** Economic and equity-focused policies reduce the gap, but excessive regulation hinders progress (Shittu et al., 2024).

# Data - Energy Poverty Proxies

Variable	Units of measurement	Definition	Source
Access to clean cooking technologies and fuels	% of total population	Access to clean fuels and technologies for cooking is the proportion of total population primarily using clean cooking fuels and technologies for cooking. Under WHO guidelines, kerosene is excluded from clean cooking fuels.	WDI
Access to electricity	% of total population	Access to electricity is the percentage of population with access to electricity. Electrification data are collected from industry, national surveys and international sources.	WDI

# Data - Control Variables

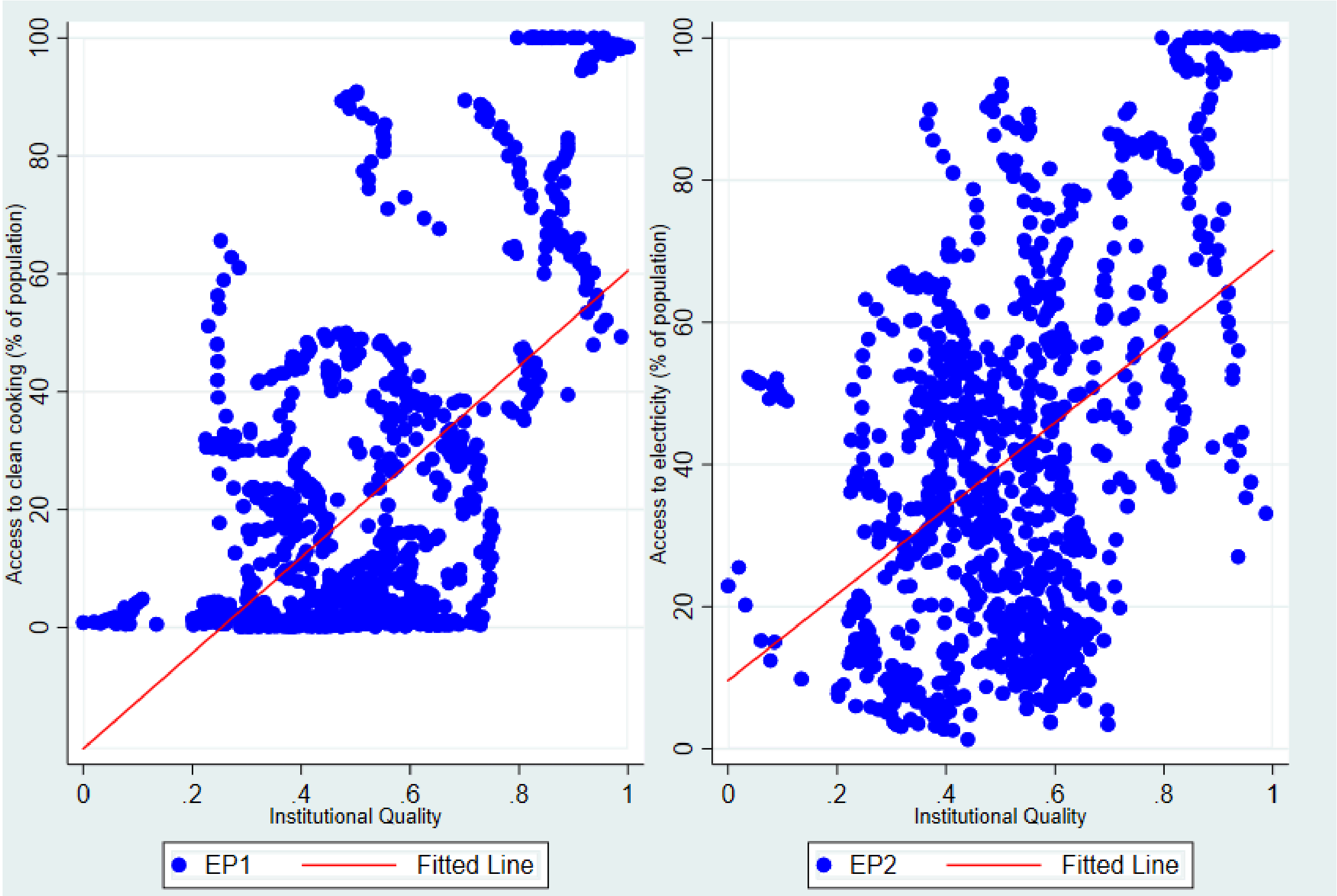
Variable	Units of measurement	Proxy for	Definition	Source
GDP per capita	PPP (constant 2021 international \$)	Economic Level	GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the country plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2021 international dollars.	WDI
Urban population	% of total population	Urbanization	Urban population refers to people living in urban areas as defined by national statistical offices. The data are collected and smoothed by United Nations Population Division.	WDI



# Data - Institutional Quality Proxies

Variable	Units of measurement	Definition	Source
Government Effectiveness	Estimate of indicator	Captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	WGI
Rule of Law	Estimate of indicator	Captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	WGI
Voice & Accountability	Estimate of indicator	Captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	WGI
Control of Corruption	Estimate of indicator	Captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	WGI
Regulatory Quality	Estimate of indicator	Captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	WGI
Political Stability and Absence of Violence/ Terrorism	Estimate of indicator	Measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	WGI

# Energy Access & Institutional Quality



# Model Specification & Methodology

## Model 1:

$$\ln EP1_{it} = \alpha_0 + \alpha_1 \ln EP1_{(it-1)} + \alpha_2 INST_{it} + \alpha_3 \ln X_{it} + \varepsilon_{it}$$

## Model 2:

$$\ln EP2_{it} = \beta_0 + \beta_1 \ln EP2_{(it-1)} + \beta_2 INST_{it} + \beta_3 \ln X_{it} + \nu_{it}$$

- EP1 is the share of the population with access to clean cooking technologies and fuels
- EP2 is the share of the population with access to electricity
- INST is a vector containing the institutional variables
- X denotes a vector of control variables
- $\varepsilon$  and  $\nu$  are the error terms

## Instrumental Variable Generalized Method of Moments (IV-GMM) (Baum et al., 2003)

- Handles endogeneity.
- Consistent even with heteroscedasticity and autocorrelation.
- Effectively accounts for temporal cross-sectional dependence.

# Results

Table 1: Aggregate Two-Step SYS-GMM

Dependent variable:	<i>Access to clean cooking (EP1)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP1	0.990*** (295.05)	0.991*** (302.14)	0.991*** (302.19)	0.991*** (298.71)	0.991*** (305.07)	0.991*** (297.86)	0.991*** (299.16)
L.Control of Corruption	0.0256 (1.51)						
L.Political Stability		-0.0539*** (-3.37)					
L.Regulatory Quality			-0.0316** (-2.09)				
L.Rule of Law				-0.0239 (-1.54)			
L.Voice and Accountability					-0.0188** (-1.98)		
L.Government Effectiveness						-0.0263 (-1.44)	
L.Institutional Quality							-0.00199* (-1.67)
GDP	0.000511 (0.11)	0.00854 (1.61)	0.00554 (1.09)	0.00486 (0.95)	0.00311 (0.60)	0.00558 (1.11)	0.00486 (0.96)
Urbanization	-0.00117 (-0.11)	-0.00390 (-0.37)	-0.00692 (-0.67)	-0.00656 (-0.62)	-0.00313 (-0.30)	-0.00701 (-0.68)	-0.00565 (-0.54)
Constant	0.0605* (1.95)	0.0445 (1.43)	0.0626* (1.96)	0.0634** (1.98)	0.0628** (1.96)	0.0589* (1.86)	0.0477 (1.51)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

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# Results

Table 2: Low-Income and Lower-Middle-Income Countries Two-Step SYS-GMM

Dependent variable:	<i>Access to clean cooking (EP1)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP1	0.991*** (365.63)	0.993*** (364.87)	0.994*** (377.60)	0.993*** (383.74)	0.993*** (373.22)	0.993*** (399.11)	0.993*** (375.69)
L.Control of Corruption	0.0479*** (2.65)						
L.Government Effectiveness		0.0134 (0.63)					
L.Political Stability			-0.0322** (-1.97)				
L.Regulatory Quality				0.000193 (0.01)			
L.Rule of Law					0.00459 (0.26)		
L.Voice and Accountability						-0.00921 (-0.94)	
L.Institutional Quality							0.000315 (0.24)
GDP	0.00499*** (6.94)	0.00446*** (5.23)	0.00348*** (4.73)	0.00414*** (5.41)	0.00423*** (5.29)	0.00400*** (5.43)	0.00422*** (5.49)
Urbanization	0.00492 (0.55)	0.00315 (0.35)	0.00324 (0.36)	0.00199 (0.22)	0.00239 (0.26)	0.00219 (0.24)	0.00218 (0.24)
Constant	-0.00179 (-0.05)	0.0161 (0.42)	0.0454 (1.22)	0.0274 (0.74)	0.0234 (0.59)	0.0322 (0.85)	0.0266 (0.74)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01



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# Results

Table 3: Upper-Middle Income Countries Two-Step SYS-GMM

Dependent variable:	<i>Access to clean cooking (EP1)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP1	0.992*** (355.61)	0.993*** (357.76)	0.995*** (366.52)	0.994*** (371.40)	0.994*** (363.34)	0.994*** (381.99)	0.994*** (364.96)
L.Control of Corruption	0.0465*** (2.59)						
L.Government Effectiveness		0.0112 (0.53)					
L.Political Stability			-0.0337** (-2.04)				
L.Regulatory Quality				-0.00189 (-0.11)			
L.Rule of Law					0.00280 (0.16)		
L.Voice and Accountability						-0.0105 (-1.08)	
L.Institutional Quality							0.000154 (0.12)
GDP	-0.00403*** (-6.25)	-0.00352*** (-4.61)	-0.00260*** (-3.81)	-0.00323*** (-4.68)	-0.00332*** (-4.58)	-0.00312*** (-4.61)	-0.00330*** (-4.76)
Urbanization	0.00632 (0.69)	0.00419 (0.45)	0.00403 (0.43)	0.00292 (0.31)	0.00335 (0.35)	0.00325 (0.35)	0.00319 (0.34)
Constant	0.0317 (0.95)	0.0472 (1.34)	0.0700** (2.02)	0.0566 (1.64)	0.0531 (1.45)	0.0595* (1.70)	0.0550 (1.64)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 3: Upper-Middle Income Countries Two-Step SYS-GMM

Dependent variable:	<i>Access to clean cooking (EP1)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
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\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

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\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 4: Aggregate Two-step SYS-GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.926*** (64.38)	0.929*** (65.47)	0.928*** (65.23)	0.927*** (64.85)	0.928*** (64.77)	0.928*** (64.97)	0.928*** (64.96)
L.Control of Corruption	0.0444* (1.87)						
L.Political Stability		0.00398 (0.15)					
L.Regulatory Quality			0.0207 (0.81)				
L.Rule of Law				0.0464* (1.85)			
L.Voice and Accountability					0.0185 (1.11)		
L.Government Effectiveness						0.0261 (1.03)	
L.Institutional Quality							0.00256 (1.35)
GDP	0.0141* (1.95)	0.0174** (2.29)	0.0157** (2.13)	0.0126* (1.72)	0.0171** (2.38)	0.0143* (1.89)	0.0144** (1.98)
Urbanization	0.0293* (1.74)	0.0243 (1.43)	0.0267 (1.59)	0.0312* (1.86)	0.0244 (1.43)	0.0280* (1.66)	0.0275 (1.63)
Constant	0.0638 (1.43)	0.0596 (1.29)	0.0584 (1.32)	0.0588 (1.33)	0.0573 (1.30)	0.0637 (1.40)	0.0784 (1.63)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 4: Aggregate Two-step SYS-GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.926*** (64.38)	0.929*** (65.47)	0.928*** (65.23)	0.927*** (64.85)	0.928*** (64.77)	0.928*** (64.97)	0.928*** (64.96)
L.Control of Corruption	0.0444* (1.87)						
L.Political Stability		0.00398 (0.15)					
L.Regulatory Quality			0.0207 (0.81)				
L.Rule of Law				0.0464* (1.85)			
L.Voice and Accountability					0.0185 (1.11)		
L.Government Effectiveness						0.0261 (1.03)	
L.Institutional Quality							0.00256 (1.35)
GDP	0.0141* (1.95)	0.0174** (2.29)	0.0157** (2.13)	0.0126* (1.72)	0.0171** (2.38)	0.0143* (1.89)	0.0144** (1.98)
Urbanization	0.0293* (1.74)	0.0243 (1.43)	0.0267 (1.59)	0.0312* (1.86)	0.0244 (1.43)	0.0280* (1.66)	0.0275 (1.63)
Constant	0.0638 (1.43)	0.0596 (1.29)	0.0584 (1.32)	0.0588 (1.33)	0.0573 (1.30)	0.0637 (1.40)	0.0784 (1.63)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 4: Aggregate Two-step SYS-GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.926*** (64.38)	0.929*** (65.47)	0.928*** (65.23)	0.927*** (64.85)	0.928*** (64.77)	0.928*** (64.97)	0.928*** (64.96)
L.Control of Corruption	0.0444* (1.87)						
L.Political Stability		0.00398 (0.15)					
L.Regulatory Quality			0.0207 (0.81)				
L.Rule of Law				0.0464* (1.85)			
L.Voice and Accountability					0.0185 (1.11)		
L.Government Effectiveness						0.0261 (1.03)	
L.Institutional Quality							0.00256 (1.35)
GDP	0.0141* (1.95)	0.0174** (2.29)	0.0157** (2.13)	0.0126* (1.72)	0.0171** (2.38)	0.0143* (1.89)	0.0144** (1.98)
Urbanization	0.0293* (1.74)	0.0243 (1.43)	0.0267 (1.59)	0.0312* (1.86)	0.0244 (1.43)	0.0280* (1.66)	0.0275 (1.63)
Constant	0.0638 (1.43)	0.0596 (1.29)	0.0584 (1.32)	0.0588 (1.33)	0.0573 (1.30)	0.0637 (1.40)	0.0784 (1.63)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01



# Results

Table 5: Low-Income and Lower-Middle-Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.96)	0.934*** (72.72)	0.939*** (76.41)	0.937*** (76.07)	0.933*** (74.02)	0.939*** (76.79)	0.936*** (74.59)
L.Control of Corruption	0.0681*** (2.73)						
L.Government Effectiveness		0.0704** (2.43)					
L.Political Stability			0.0297 (1.09)				
L.Regulatory Quality				0.0559* (1.90)			
L.Rule of Law					0.0788*** (2.86)		
L.Voice and Accountability						0.0259 (1.49)	
L.Institutional Quality							0.00514** (2.41)
GDP	0.00188** (2.35)	0.00242** (2.42)	0.00116 (1.25)	0.00174* (1.72)	0.00238*** (2.63)	0.000908 (1.09)	0.00201** (2.20)
Urbanization	0.0398** (2.37)	0.0411** (2.43)	0.0320* (1.89)	0.0383** (2.27)	0.0430** (2.56)	0.0333** (1.96)	0.0381** (2.26)
Constant	0.0927* (1.93)	0.0754 (1.56)	0.114** (2.28)	0.0861* (1.65)	0.0647 (1.31)	0.117** (2.23)	0.118** (2.35)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 5: Low-Income and Lower-Middle-Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.96)	0.934*** (72.72)	0.939*** (76.41)	0.937*** (76.07)	0.933*** (74.02)	0.939*** (76.79)	0.936*** (74.59)
L.Control of Corruption	0.0681*** (2.73)						
L.Government Effectiveness		0.0704** (2.43)					
L.Political Stability			0.0297 (1.09)				
L.Regulatory Quality				0.0559* (1.90)			
L.Rule of Law					0.0788*** (2.86)		
L.Voice and Accountability						0.0259 (1.49)	
L.Institutional Quality							0.00514** (2.41)
GDP	0.00188** (2.35)	0.00242** (2.42)	0.00116 (1.25)	0.00174* (1.72)	0.00238*** (2.63)	0.000908 (1.09)	0.00201** (2.20)
Urbanization	0.0398** (2.37)	0.0411** (2.43)	0.0320* (1.89)	0.0383** (2.27)	0.0430** (2.56)	0.0333** (1.96)	0.0381** (2.26)
Constant	0.0927* (1.93)	0.0754 (1.56)	0.114** (2.28)	0.0861* (1.65)	0.0647 (1.31)	0.117** (2.23)	0.118** (2.35)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 5: Low-Income and Lower-Middle-Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.96)	0.934*** (72.72)	0.939*** (76.41)	0.937*** (76.07)	0.933*** (74.02)	0.939*** (76.79)	0.936*** (74.59)
L.Control of Corruption	0.0681*** (2.73)						
L.Government Effectiveness		0.0704** (2.43)					
L.Political Stability			0.0297 (1.09)				
L.Regulatory Quality				0.0559* (1.90)			
L.Rule of Law					0.0788*** (2.86)		
L.Voice and Accountability						0.0259 (1.49)	
L.Institutional Quality							0.00514** (2.41)
GDP	0.00188** (2.35)	0.00242** (2.42)	0.00116 (1.25)	0.00174* (1.72)	0.00238*** (2.63)	0.000908 (1.09)	0.00201** (2.20)
Urbanization	0.0398** (2.37)	0.0411** (2.43)	0.0320* (1.89)	0.0383** (2.27)	0.0430** (2.56)	0.0333** (1.96)	0.0381** (2.26)
Constant	0.0927* (1.93)	0.0754 (1.56)	0.114** (2.28)	0.0861* (1.65)	0.0647 (1.31)	0.117** (2.23)	0.118** (2.35)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 5: Low-Income and Lower-Middle-Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.96)	0.934*** (72.72)	0.939*** (76.41)	0.937*** (76.07)	0.933*** (74.02)	0.939*** (76.79)	0.936*** (74.59)
L.Control of Corruption	0.0681*** (2.73)						
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L.Voice and Accountability						0.0259 (1.49)	
L.Institutional Quality							0.00514** (2.41)
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Urbanization	0.0398** (2.37)	0.0411** (2.43)	0.0320* (1.89)	0.0383** (2.27)	0.0430** (2.56)	0.0333** (1.96)	0.0381** (2.26)
Constant	0.0927* (1.93)	0.0754 (1.56)	0.114** (2.28)	0.0861* (1.65)	0.0647 (1.31)	0.117** (2.23)	0.118** (2.35)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 5: Low-Income and Lower-Middle-Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.96)	0.934*** (72.72)	0.939*** (76.41)	0.937*** (76.07)	0.933*** (74.02)	0.939*** (76.79)	0.936*** (74.59)
L.Control of Corruption	0.0681*** (2.73)						
L.Government Effectiveness		0.0704** (2.43)					
L.Political Stability			0.0297 (1.09)				
L.Regulatory Quality				0.0559* (1.90)			
L.Rule of Law					0.0788*** (2.86)		
L.Voice and Accountability						0.0259 (1.49)	
L.Institutional Quality							0.00514** (2.41)
GDP	0.00188** (2.35)	0.00242** (2.42)	0.00116 (1.25)	0.00174* (1.72)	0.00238*** (2.63)	0.000908 (1.09)	0.00201** (2.20)
Urbanization	0.0398** (2.37)	0.0411** (2.43)	0.0320* (1.89)	0.0383** (2.27)	0.0430** (2.56)	0.0333** (1.96)	0.0381** (2.26)
Constant	0.0927* (1.93)	0.0754 (1.56)	0.114** (2.28)	0.0861* (1.65)	0.0647 (1.31)	0.117** (2.23)	0.118** (2.35)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 5: Low-Income and Lower-Middle-Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.96)	0.934*** (72.72)	0.939*** (76.41)	0.937*** (76.07)	0.933*** (74.02)	0.939*** (76.79)	0.936*** (74.59)
L.Control of Corruption	0.0681*** (2.73)						
L.Government Effectiveness		0.0704** (2.43)					
L.Political Stability			0.0297 (1.09)				
L.Regulatory Quality				0.0559* (1.90)			
L.Rule of Law					0.0788*** (2.86)		
L.Voice and Accountability						0.0259 (1.49)	
L.Institutional Quality							0.00514** (2.41)
GDP	0.00188** (2.35)	0.00242** (2.42)	0.00116 (1.25)	0.00174* (1.72)	0.00238*** (2.63)	0.000908 (1.09)	0.00201** (2.20)
Urbanization	0.0398** (2.37)	0.0411** (2.43)	0.0320* (1.89)	0.0383** (2.27)	0.0430** (2.56)	0.0333** (1.96)	0.0381** (2.26)
Constant	0.0927* (1.93)	0.0754 (1.56)	0.114** (2.28)	0.0861* (1.65)	0.0647 (1.31)	0.117** (2.23)	0.118** (2.35)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 5: Low-Income and Lower-Middle-Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.96)	0.934*** (72.72)	0.939*** (76.41)	0.937*** (76.07)	0.933*** (74.02)	0.939*** (76.79)	0.936*** (74.59)
L.Control of Corruption	0.0681*** (2.73)						
L.Government Effectiveness		0.0704** (2.43)					
L.Political Stability			0.0297 (1.09)				
L.Regulatory Quality				0.0559* (1.90)			
L.Rule of Law					0.0788*** (2.86)		
L.Voice and Accountability						0.0259 (1.49)	
L.Institutional Quality							0.00514** (2.41)
GDP	0.00188** (2.35)	0.00242** (2.42)	0.00116 (1.25)	0.00174* (1.72)	0.00238*** (2.63)	0.000908 (1.09)	0.00201** (2.20)
Urbanization	0.0398** (2.37)	0.0411** (2.43)	0.0320* (1.89)	0.0383** (2.27)	0.0430** (2.56)	0.0333** (1.96)	0.0381** (2.26)
Constant	0.0927* (1.93)	0.0754 (1.56)	0.114** (2.28)	0.0861* (1.65)	0.0647 (1.31)	0.117** (2.23)	0.118** (2.35)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 6: Upper-Middle Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.22)	0.935*** (72.57)	0.939*** (75.46)	0.937*** (75.22)	0.934*** (73.47)	0.939*** (75.47)	0.936*** (73.95)
L.Control of Corruption	0.0644*** (2.61)						
L.Government Effectiveness		0.0653** (2.29)					
L.Political Stability			0.0262 (0.97)				
L.Regulatory Quality				0.0509* (1.76)			
L.Rule of Law					0.0748*** (2.75)		
L.Voice and Accountability						0.0239 (1.39)	
L.Institutional Quality							0.00478** (2.29)
GDP	-0.000988 (-1.38)	-0.00147* (-1.71)	-0.000354 (-0.43)	-0.000847 (-0.96)	-0.00146* (-1.85)	-0.000119 (-0.16)	-0.00110 (-1.39)
Urbanization	0.0388** (2.31)	0.0401** (2.37)	0.0314* (1.85)	0.0372** (2.20)	0.0421** (2.51)	0.0324* (1.90)	0.0373** (2.21)
Constant	0.110** (2.37)	0.0966** (2.09)	0.127*** (2.65)	0.104** (2.12)	0.0855* (1.82)	0.128** (2.57)	0.134*** (2.75)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01



# Results

Table 6: Upper-Middle Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.22)	0.935*** (72.57)	0.939*** (75.46)	0.937*** (75.22)	0.934*** (73.47)	0.939*** (75.47)	0.936*** (73.95)
L.Control of Corruption	0.0644*** (2.61)						
L.Government Effectiveness		0.0653** (2.29)					
L.Political Stability			0.0262 (0.97)				
L.Regulatory Quality				0.0509* (1.76)			
L.Rule of Law					0.0748*** (2.75)		
L.Voice and Accountability						0.0239 (1.39)	
L.Institutional Quality							0.00478** (2.29)
GDP	-0.000988 (-1.38)	-0.00147* (-1.71)	-0.000354 (-0.43)	-0.000847 (-0.96)	-0.00146* (-1.85)	-0.000119 (-0.16)	-0.00110 (-1.39)
Urbanization	0.0388** (2.31)	0.0401** (2.37)	0.0314* (1.85)	0.0372** (2.20)	0.0421** (2.51)	0.0324* (1.90)	0.0373** (2.21)
Constant	0.110** (2.37)	0.0966** (2.09)	0.127*** (2.65)	0.104** (2.12)	0.0855* (1.82)	0.128** (2.57)	0.134*** (2.75)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 6: Upper-Middle Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.22)	0.935*** (72.57)	0.939*** (75.46)	0.937*** (75.22)	0.934*** (73.47)	0.939*** (75.47)	0.936*** (73.95)
L.Control of Corruption	0.0644*** (2.61)						
L.Government Effectiveness		0.0653** (2.29)					
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\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 6: Upper-Middle Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.22)	0.935*** (72.57)	0.939*** (75.46)	0.937*** (75.22)	0.934*** (73.47)	0.939*** (75.47)	0.936*** (73.95)
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Constant	0.110** (2.37)	0.0966** (2.09)	0.127*** (2.65)	0.104** (2.12)	0.0855* (1.82)	0.128** (2.57)	0.134*** (2.75)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 6: Upper-Middle Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.22)	0.935*** (72.57)	0.939*** (75.46)	0.937*** (75.22)	0.934*** (73.47)	0.939*** (75.47)	0.936*** (73.95)
L.Control of Corruption	0.0644*** (2.61)						
L.Government Effectiveness		0.0653** (2.29)					
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\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

# Results

Table 6: Upper-Middle Income Countries Two-step System GMM

Dependent variable:	<i>Access to electricity (EP2)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.EP2	0.935*** (73.22)	0.935*** (72.57)	0.939*** (75.46)	0.937*** (75.22)	0.934*** (73.47)	0.939*** (75.47)	0.936*** (73.95)
L.Control of Corruption	0.0644*** (2.61)						
L.Government Effectiveness		0.0653** (2.29)					
L.Political Stability			0.0262 (0.97)				
L.Regulatory Quality				0.0509* (1.76)			
L.Rule of Law					0.0748*** (2.75)		
L.Voice and Accountability						0.0239 (1.39)	
L.Institutional Quality							0.00478** (2.29)
GDP	-0.000988 (-1.38)	-0.00147* (-1.71)	-0.000354 (-0.43)	-0.000847 (-0.96)	-0.00146* (-1.85)	-0.000119 (-0.16)	-0.00110 (-1.39)
Urbanization	0.0388** (2.31)	0.0401** (2.37)	0.0314* (1.85)	0.0372** (2.20)	0.0421** (2.51)	0.0324* (1.90)	0.0373** (2.21)
Constant	0.110** (2.37)	0.0966** (2.09)	0.127*** (2.65)	0.104** (2.12)	0.0855* (1.82)	0.128** (2.57)	0.134*** (2.75)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

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# Conclusion

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## Overall Insights:

- Institutional quality has complex, context-dependent impacts on energy access.
- Institutional quality's impact varies across income groups.
- Economic resources and urbanization are important determinants of energy access.
- Results highlight the importance of tailored policies for different income groups.

## Implications:

- Strengthen anti-corruption measures to improve energy access.
- Improve governance to enhance electricity access.
- Focus on economic growth and urbanization to improve access in low-income and lower-middle income countries.

**We welcome comments and suggestions.**

**Thank you.**



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# Pairwise Correlation Results

Table 7: Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Access to clean cooking	1.000										
(2) Access to electricity	0.678 (0.000)	1.000									
(3) Control of Corruption	0.395 (0.000)	0.339 (0.000)	1.000								
(4) Government Effectiveness	0.474 (0.000)	0.363 (0.000)	0.862 (0.000)	1.000							
(5) Political Stability	0.410 (0.000)	0.352 (0.000)	0.707 (0.000)	0.696 (0.000)	1.000						
(6) Regulatory Quality	0.373 (0.000)	0.286 (0.000)	0.812 (0.000)	0.904 (0.000)	0.660 (0.000)	1.000					
(7) Rule of Law	0.428 (0.000)	0.342 (0.000)	0.880 (0.000)	0.916 (0.000)	0.775 (0.000)	0.897 (0.000)	1.000				
(8) Voice & Accountability	0.274 (0.000)	0.276 (0.000)	0.754 (0.000)	0.738 (0.000)	0.675 (0.000)	0.761 (0.000)	0.809 (0.000)	1.000			
(9) Institutional Quality	0.432 (0.000)	0.359 (0.000)	0.922 (0.000)	0.942 (0.000)	0.822 (0.000)	0.927 (0.000)	0.970 (0.000)	0.867 (0.000)	1.000		
(10) GDP	0.788 (0.000)	0.752 (0.000)	0.406 (0.000)	0.531 (0.000)	0.514 (0.000)	0.434 (0.000)	0.459 (0.000)	0.282 (0.000)	0.481 (0.000)	1.000	
(11) Urbanization	0.533 (0.000)	0.676 (0.000)	0.136 (0.000)	0.135 (0.000)	0.315 (0.000)	0.096 (0.003)	0.101 (0.002)	0.204 (0.000)	0.176 (0.000)	0.640 (0.000)	1.000



# Sample Countries

Table 8: Sub-Saharan African sample countries included in the analysis

Nr.	Country	Nr.	Country	Nr.	Country	Nr.	Country	Nr.	Country
1.	Angola	10.	Comoros	19.	Ghana	28.	Mauritius	37.	Sierra Leone
2.	Benin	11.	Congo, Dem. Rep.	20.	Guinea	29.	Mozambique	38.	Somalia
3.	Botswana	12.	Congo, Rep.	21.	Guinea-Bissau	30.	Namibia	39.	South Africa
4.	Burkina Faso	13.	Cote d'Ivoire	22.	Kenya	31.	Niger	40.	Sudan
5.	Burundi	14.	Equatorial Guinea	23.	Lesotho	32.	Nigeria	41.	Tanzania
6.	Cabo Verde	15.	Eswatini	24.	Madagascar	33.	Rwanda	42.	Togo
7.	Cameroon	16.	Ethiopia	25.	Malawi	34.	Sao Tome and Principe	43.	Uganda
8.	Central African Republic	17.	Gabon	26.	Mali	35.	Senegal	44.	Zambia
9.	Chad	18.	Gambia, The	27.	Mauritania	36.	Seychelles	45.	Zimbabwe

Note: These are the names of SSA countries as they appear in the World Bank's World Development Indicators and Worldwide Governance Indicators.

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