The consumption of energy such as electricity has been cited as a driving force that powers the growth of an economy. Kraft and Kraft (1978)
documented a positive relationship between energy consumption and the
growth of national income in the United States of America. Although Kraft
and Kraft found unidirectional causality running from national income to
energy consumption, subsequent studies have found evidence of how the
consumption of energy like electricity drives productive activities and
influences economic growth. Yoo (2006) found positive effects of electricity
consumption on growth in Singapore and Malaysia, Aytac and Guran (2011)
found evidence in Turkey, and Wolde-Rufael (2004) found the same in
seventeen African countries.

The essence of electricity consumption to growth has led to various state-
sponsored policies and programmes to expand and extend electricity to as
many Ghanaians as possible. The National Electrification Programme and the
Self-Help Electrification projects are major projects that have been rolled out
to meet Ghana’s goal of achieving universal access to electricity by the year
2030. Consequently, the access rate to electricity increased from 30.6 percent
in 1993 to 60.5 percent in 2008 and further to 82.39 percent in 2020 (Energy
Commission of Ghana, 2020). The rate of access to electricity in Ghana saw a
169% increase over the past 27 years which is considered remarkable for a
developing country in Africa. Although Ghana still has a long way to go
concerning achieving a universal access rate, the majority of Ghanaians have
been brought to the light and presented with an opportunity to better their
lives.

However, the consumption of electricity per capita in Ghana reduced
from 336.07 kWh per capita in 1993 to 261.29 kWh per capita in 2008 but
bounced back to 358.53 kWh per capita in 2020 (World Bank Development
Indicators, 2020). Essentially, the consumption of electricity only grew by
6.6% which is significantly low compared to the growth in electricity access
over the same period. Factors such as erratic power outages experienced from
2010 to 2015 have been cited as reasons for this low consumption of
electricity (Mensah, 2016). Of course, power outages cannot wholly explain
why the massive improvement in electricity access has not been reflected in
the consumption of electricity in Ghana and this demands an empirical study
to estimate the effect of electricity access on electricity consumption in
Ghana. Perhaps, the needed and expected increase in electricity consumption
despite massive electrification has not been seen due to an improvement in
the efficiency of power use in Ghana (Bhattacharyya, 2011).

From an extensive search of the literature, this is the first study to
empirically examine the influence of electricity access on electricity
consumption in Ghana as extant studies such as Twerefo et al. (2008), Ackah,
Adu and Takyi (2015), and Sarkodie (2017) only concentrated on the growth-
electricity consumption nexus. Access to electricity is considered essential
because it is the first step to the consumption of electricity which further leads
to growth. As a matter of fact, consumption of electricity will be limited if its
access is inadequate. It is therefore imperative to examine the link between
electricity access and electricity consumption in Ghana. The objective of this
paper is twofold: first is to estimate the effect of electricity access on
electricity consumption in Ghana for the last thirty years and second, to
estimate the other factors that influenced electricity consumption in Ghana for
the same period.

2. Literature Review
2.1 Theoretical review
This study is underpinned by the theory of demand which states that the
demand and consumption of any particular good are determined by the good’s
own price and other factors such as the income of the consumer, consumers’
tastes and preferences, and changes in the prices of its substitutes and
compliments (Slowman and Wride, 2009). Central to the theory of demand is
the law of demand which postulates an inverse relationship between the price
of a commodity and the quantity demanded of that commodity. Essentially,
an increase in the price of the commodity reduces the quantity demanded
while a fall in the price of the good increases the quantity of the commodity
demanded, all other things being equal. The demand for electricity is a
derived one which means electricity is not demanded for its own sake but for
the benefits it gives.

Demand for electricity consists of two parts. The part that is satisfied is
the amount of electricity consumed and the unfulfilled part is known as the
unmet demand which is largely due to inadequate access. Essentially, unmet demand represents the number of individuals who would want to consume electricity for their various needs but are unable to do so because the energy resource is not readily available to them (Bhattacharyya, 2011). In the end, it is the fulfilled part of electricity demand, which is the total amount of electricity consumed over a given period, that is measured. Electricity price changes permeate throughout the entire economy to influence the prices of other goods and services. This largely stems from the fact that electricity enters into the production function of almost all goods and services and it follows that a change in its price is bound to affect the demand and supply of such goods and services (Aytac and Guran, 2011).

2.2 Empirical review

After the influential paper by Kraft and Kraft (1978) on the positive effect of electricity consumption on economic growth in the United States (US), several studies have confirmed this finding in many jurisdictions (Aytac and Guran, 2011; Yoo, 2006; and Wolde-Rufael, 2004). A group of studies has also focused on electricity consumption and other indicators. Sami (2011), for example, investigated the relationship between electricity consumption, exports, and national income per capita in Japan. The final group of empirical studies mostly on Ghana, have focused on different aspects of electricity supply and demand as well as the myriad of issues that comes with them.

For instance, Ackah et al. (2014) explored the exogenous and endogenous factors of electricity demand and found that increased level of education of consumers reduced their electricity consumption because such consumers were energy efficient. Sarkodie (2017) forecast the consumption of electricity in Ghana by the year 2030 and revealed that the country’s consumption will grow from 8.52 billion kWh in 2012 to 9.56 billion kWh by the year 2030. While Kumi (2017) reviewed the electricity situation in Ghana, Kemausuor and Ackom (2017) revealed that the disparity between rural and urban access to electricity, inadequate electricity supply, and low generation capacity are some of the shortfalls obstructing Ghana’s goal of universal electrification. Kwakwa (2018) found education, electricity price, income, and population to be some of the factors that determine electricity power losses in Ghana. Yakubu, Babu and Adjei (2018) also examined the influence of electricity
Electricity Access and Consumption in Ghana

theft on the income generation capacity of utility companies in Ghana. Twerefou and Abeney (2020) investigated the efficiency of electricity consumption for households in Ghana and found that the low educational level of some consumers and power outages reduce efficiency. This finding confirmed the conclusions of Ackah et al. (2014) and Kwakwa (2018) who found that high level of education improves the efficiency of electricity use. Other factors such as appliance use, location, load, and regional zones were found to influence electricity demand in Ghana. Most recently, Abeberese, Ackah and Asuming (2021) examined how Ghanaian firms respond to electricity outages and how it influences their productivity. They concluded that changing the production mix to less electricity-intensive ones can help firms to mitigate the effects of electricity outages.

The foregoing review of empirical literature reveals limited studies that link electricity access to the consumption of electricity, especially in Ghana. It is essential to establish the effect of electricity access on electricity consumption because the benefits of electricity will not be manifested without access to the energy resource in the first place. We build on this by finding out how the rate of access to electricity affects its consumption, especially considering the aim of the Ghanaian government to achieve universal access to electricity by 2030. Does increasing electricity access necessarily promote its consumption? This is the main question this study sought to answer.

3. Methodology

3.1 Model specification

The purpose of this paper is to estimate the effect of electricity access on the consumption of electricity in Ghana using data from 1990 to 2020. The study acknowledges the importance of electricity consumption to economic growth as suggested by Kraft and Kraft (1978). However, access to electricity is a prerequisite for the consumption of electricity. Consequently, the study regresses the consumption of electricity on the rate of its access plus other significant factors such as price, income, and population. The functional form of the model is specified as follows:
The econometric form of equation 1 can be written as:

\[ EC_t = f( EA_t, POP_t, GDP_t, HDI_t, CPI_t) \]  

(1)

\[ EC_t = \beta_0 + \beta_1 EA_t + \beta_2 \ln POP_t + \beta_3 \ln GDP_t + \beta_4 HDI_t + \beta_5 \ln CPI_t + \mu_t, \ldots \]  

(2)

where:

- \( EC_t \): electricity consumption
- \( EA_t \): access rate measured as a percentage of the population
- \( GDP_t \): gross domestic product
- \( POP_t \): total population
- \( HDI_t \): Ghana’s human development index
- \( CPI_t \): consumer price index which is the proxy for electricity price
- \( \beta_0 \): the intercept
- \( \mu_t \): stochastic error term
- \( \beta_1 \) to \( \beta_5 \): coefficients of the independent variables.

### 3.2 Type and source of data

The study used annual data from the World Bank Development Indicators (WDI) datasets from 1990 to 2020. The choice of variables stems from the theory of demand which states that the demand and consumption of any particular good are influenced by the price and the income of the consumer among other factors (Slowman and Wride, 2009). Electricity consumption is measured in kilowatt per hour (KWh) per capita. Electricity access is measured as the percentage of the population with access to electric power. An increase in electricity access is expected to increase the number of individuals connected to the national grid and hence increase the consumption of electricity. The study hence expects electricity access to have a positive effect on electricity consumption, holding all other factors constant. Also, the price of any commodity is postulated to have an inverse relationship with that commodity and it is therefore expected that the consumer price index which is a proxy for electricity prices will have a negative effect on its consumption.
The consumer price index is used as a proxy for electricity price due to limited data.

Again, income is measured as the yearly gross domestic product for Ghana. Income is expected to have a positive effect on electricity consumption because evidence from Kraft and Kraft (1978) suggests that higher levels of income are accompanied by higher levels of electricity consumption. An increase in population increases the total demand and consumption of electricity which informs the study to expect a positive relationship between them. The human development index (HDI) measures the level of development of a country taking into consideration its educational, health, and income aspects. As a development indicator, it is expected that increases in it signal the development of a country and suggest a fall in the use of energy such as electricity as indicated by the Kuznets curve. Essentially, a country shifts from the use of less efficient production technology and equipment to more efficient ones as they experience structural and technological development (Zhao et al., 2017). The efficiency of modern technology reduces the intensity of electricity use and it is therefore expected that a negative relationship exists between HDI and the consumption of electricity.

3.3 Estimation strategy

The study follows Sims (1980) and used a vector error correction (VEC) model to achieve its objectives. The VEC model implies that each variable in the system is explained by its lagged values and the lags of other variables plus the error correction term. The empirical model to be estimated with the six (6) variables is expressed as:
\[ \Delta EC_t \]
\[ = \beta_0 + \sum_{i=1}^{k-1} \theta_i \Delta EC_{t-i} + \sum_{j=1}^{k-1} \alpha_j \Delta EA_{t-j} + \sum_{p=1}^{k-1} \delta_p \Delta \ln GDP_{t-p} \]
\[ + \sum_{m=1}^{k-1} \gamma_m \Delta \ln CPI_{t-m} + \sum_{g=1}^{k-1} \lambda_g \Delta HDI_{t-g} + \sum_{f=1}^{k-1} \psi_f \Delta \ln POP_{t-f} \]
\[ + \phi_1 ECT_{t-1} + \epsilon_{1t} \]  \hfill (3)

\[ \Delta EA_t \]
\[ = \beta_0 + \sum_{i=1}^{k-1} \theta_i \Delta EC_{t-i} + \sum_{j=1}^{k-1} \alpha_j \Delta EA_{t-j} + \sum_{p=1}^{k-1} \delta_p \Delta \ln GDP_{t-p} \]
\[ + \sum_{m=1}^{k-1} \gamma_m \Delta \ln CPI_{t-m} + \sum_{g=1}^{k-1} \lambda_g \Delta HDI_{t-g} + \sum_{f=1}^{k-1} \psi_f \Delta \ln POP_{t-f} \]
\[ + \phi_2 ECT_{t-1} + \epsilon_{2t} \]  \hfill (4)

\[ \Delta \ln GDP_t \]
\[ = \beta_0 + \sum_{i=1}^{k-1} \theta_i \Delta EC_{t-i} + \sum_{j=1}^{k-1} \alpha_j \Delta EA_{t-j} + \sum_{p=1}^{k-1} \delta_p \Delta \ln GDP_{t-p} \]
\[ + \sum_{m=1}^{k-1} \gamma_m \Delta \ln CPI_{t-m} + \sum_{g=1}^{k-1} \lambda_g \Delta HDI_{t-g} + \sum_{f=1}^{k-1} \psi_f \Delta \ln POP_{t-f} \]
\[ + \phi_3 ECT_{t-1} + \epsilon_{3t} \]  \hfill (5)

\[ \ln CPI_t \]
\[ = \beta_0 + \sum_{i=1}^{k-1} \theta_i \Delta EC_{t-i} + \sum_{j=1}^{k-1} \alpha_j \Delta EA_{t-j} + \sum_{p=1}^{k-1} \delta_p \Delta \ln GDP_{t-p} \]
\[ + \sum_{m=1}^{k-1} \gamma_m \Delta \ln CPI_{t-m} + \sum_{g=1}^{k-1} \lambda_g \Delta HDI_{t-g} + \sum_{f=1}^{k-1} \psi_f \Delta \ln POP_{t-f} \]
\[ + \phi_4 ECT_{t-1} + \epsilon_{4t} \]  \hfill (6)
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\[ \Delta HDI_t = \beta_0 + \sum_{i=1}^{k-1} \theta_i \Delta EC_{t-i} + \sum_{j=1}^{k-1} \alpha_j \Delta EA_{t-j} + \sum_{p=1}^{k-1} \delta_p \Delta \ln GDP_{t-p} \\
+ \sum_{m=1}^{k-1} \gamma_m \Delta \ln CPI_{t-m} + \sum_{g=1}^{k-1} \lambda_g \Delta HDI_{t-g} + \sum_{f=1}^{k-1} \psi_f \Delta \ln POP_{t-f} \\
+ \phi_5 ECT_{t-1} + \varepsilon_{5t} \quad (7) \]

\[ \Delta \ln POP_t = \beta_0 + \sum_{i=1}^{k-1} \theta_i \Delta EC_{t-i} + \sum_{j=1}^{k-1} \alpha_j \Delta EA_{t-j} + \sum_{p=1}^{k-1} \delta_p \Delta \ln GDP_{t-p} \\
+ \sum_{m=1}^{k-1} \gamma_m \Delta \ln CPI_{t-m} + \sum_{g=1}^{k-1} \lambda_g \Delta HDI_{t-g} + \sum_{f=1}^{k-1} \psi_f \Delta \ln POP_{t-f} \\
+ \phi_6 ECT_{t-1} + \varepsilon_{6t} \quad (8) \]

where: \( \beta_0 \) is the constant term, and \( \theta, \alpha, \delta, \gamma, \lambda, \psi, \phi \) are the coefficients of electricity consumption, electricity access, income, price level, HDI, population, and the error correction term respectively. \( \varepsilon_t \) is the white noise error term and all variables are as already defined.

4. Empirical Results

4.1 Descriptive statistics and pre-estimation tests

Part A of Table 1 shows electricity consumption per capita over the study period, averaged 319.83 kWh with a standard deviation of 47.96 kWh, while the access rate to electricity in Ghana averaged 54.78% with a standard deviation of just 18.44%. The consumer price index which is a proxy for electricity price was quite high with an average of about 81% while Ghana’s index for HDI over the same period had a mean of 0.523, which shows that the country is doing relatively well. Ghana’s national income averaged 28.2 million GHS and a population with a mean of 22.2 million people.
# Table 1. Descriptive Statistics of Variables and the Results of Stationary Tests

<table>
<thead>
<tr>
<th>Var</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
<th>Var ADF test</th>
<th>Philip-Perron Test</th>
<th>Order of Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC (kwh)</td>
<td>319.83</td>
<td>47.96</td>
<td>216.90</td>
<td>386.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EA (%)</td>
<td>54.78</td>
<td>18.44</td>
<td>25</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>28.2</td>
<td>13.8</td>
<td>12.0</td>
<td>53.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPI (%)</td>
<td>81.51</td>
<td>81.65</td>
<td>2.16</td>
<td>255</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDI</td>
<td>0.523</td>
<td>0.053</td>
<td>0.45</td>
<td>0.61</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POP (mil.)</td>
<td>22.2</td>
<td>4.79</td>
<td>14.8</td>
<td>29.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Var</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
<th>Var ADF test</th>
<th>Philip-Perron Test</th>
<th>Order of Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: Levels</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC</td>
<td>-2.175</td>
<td>-2.16</td>
<td>-2.128</td>
<td>-2.091</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EA</td>
<td>-0.791</td>
<td>-3.08</td>
<td>-0.921</td>
<td>-4.149</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>0.881</td>
<td>-1.76</td>
<td>0.668</td>
<td>-1.797</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPI</td>
<td>1.612</td>
<td>-1.54</td>
<td>1.144</td>
<td>-1.603</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel B: First Difference</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>-3.180***</td>
<td>-3.548***</td>
<td>-3.121***</td>
<td>-3.584***</td>
<td></td>
<td></td>
<td>I(1)</td>
</tr>
<tr>
<td>CPI</td>
<td>-2.993***</td>
<td>-3.584***</td>
<td>-2.990***</td>
<td>-3.608***</td>
<td></td>
<td></td>
<td>I(1)</td>
</tr>
</tbody>
</table>

Notes: GDP measured in million GHS.

Source: Author’s estimation based on data from WDI & STATA estimation based on data from WDI.
### Table 2. Results of Selection Order Criteria and Johansen Cointegration Test

<table>
<thead>
<tr>
<th>Lag</th>
<th>LL</th>
<th>LR</th>
<th>Df</th>
<th>P</th>
<th>FPE</th>
<th>AIC</th>
<th>HQIC</th>
<th>SBIC</th>
<th>Maximum Rank</th>
<th>Parms</th>
<th>LL</th>
<th>Eigenvalue</th>
<th>Trace statistic</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>85.072</td>
<td>9.2e-11</td>
<td>-6.08246</td>
<td>-5.99886</td>
<td>-5.79213</td>
<td>0</td>
<td>42</td>
<td>105.87779</td>
<td>.</td>
<td>115.5360</td>
<td>94.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>123.156</td>
<td>76.169</td>
<td>36</td>
<td>0.000</td>
<td>8.5e-11</td>
<td>-6.2428</td>
<td>-5.65757</td>
<td>-4.21049</td>
<td>1</td>
<td>53</td>
<td>125.6154</td>
<td>0.75582</td>
<td>76.0607</td>
<td>68.52</td>
</tr>
<tr>
<td>2</td>
<td>157.765</td>
<td>69.217</td>
<td>36</td>
<td>0.001</td>
<td>1.6e-11</td>
<td>-6.13578</td>
<td>-5.04892</td>
<td>-2.36149</td>
<td>2</td>
<td>62</td>
<td>139.57489</td>
<td>0.63105</td>
<td>48.1418</td>
<td>47.21</td>
</tr>
<tr>
<td>3</td>
<td>226.565</td>
<td>137.6</td>
<td>36</td>
<td>0.000</td>
<td>7.7e-11</td>
<td>-8.65884</td>
<td>-7.07035</td>
<td>-3.14257</td>
<td>3</td>
<td>69</td>
<td>149.84822</td>
<td>0.51992</td>
<td>27.5951*</td>
<td>29.68</td>
</tr>
<tr>
<td>4</td>
<td>274.075</td>
<td>5028.4*</td>
<td>36</td>
<td>0.000</td>
<td>1.9e-11</td>
<td>-199.288*</td>
<td>-197.19*</td>
<td>-192.03*</td>
<td>4</td>
<td>74</td>
<td>156.39922</td>
<td>0.37370</td>
<td>14.4931</td>
<td>15.41</td>
</tr>
</tbody>
</table>

Endogenous: dE, dEA, dHDI
Dpop, dGDP, Dlcpi
Exogenous: _cons

*Source: STATA estimation based on data from WDI.*
According to Part B of Table 1, all the variables were not stable at the level for both tests, as can be seen in panel A. The study then proceeded with the first difference. The results show that all variables became stationary after the first difference. Hence, all the series in the model are integrated of order one and therefore justify the estimation of the VEC model.

Part A of Table 2 shows that all the criteria supported a lag length of 4. The study, therefore, proceeded to carry out the co-integration test. From the B part of the same table, the trace statistics show that there are at least three co-integrating equations. This is because the trace statistics for lags 1 to 3 exceeded their 5% critical values and led to the rejection of the null hypothesis that there is no co-integration. The long-run relationship among the variables validates the use of a VEC model.

**4.2 Influence of electricity access on electricity consumption in Ghana**

The short-run and long-run effects of electricity access and other relevant factors on Ghana’s electricity consumption and the post-estimation test results are presented in Table 3. This presentation helps explain how access to electricity influenced Ghana’s consumption of electricity from 1990 to 2020.

**Table 3. Effect of Electricity Access on Electricity Consumption in Ghana**

<table>
<thead>
<tr>
<th>Electricity Consumption</th>
<th>Short-run</th>
<th>Long run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed of Adjustment</td>
<td>-0.418***</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.159)</td>
<td></td>
</tr>
<tr>
<td>Electricity access</td>
<td>-10.46*</td>
<td>-61.02***</td>
</tr>
<tr>
<td></td>
<td>(5.465)</td>
<td>(9.084)</td>
</tr>
<tr>
<td>National income (ln)</td>
<td>8.59**</td>
<td>-1.33</td>
</tr>
<tr>
<td></td>
<td>(4.38)</td>
<td>(4.75)</td>
</tr>
<tr>
<td>Human development index</td>
<td>-13.66</td>
<td>13.11***</td>
</tr>
<tr>
<td></td>
<td>(1.050)</td>
<td>(2.62)</td>
</tr>
<tr>
<td>Population (ln)</td>
<td>-32.50**</td>
<td>-5.47*</td>
</tr>
<tr>
<td></td>
<td>(18.23)</td>
<td>(43.94)</td>
</tr>
<tr>
<td>Price level (ln)</td>
<td>1.74</td>
<td>0.824</td>
</tr>
<tr>
<td></td>
<td>(1.13)</td>
<td>(1.20)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.00246</td>
<td>131.79</td>
</tr>
<tr>
<td></td>
<td>(9.03)</td>
<td></td>
</tr>
</tbody>
</table>
The speed of adjustment was negative, significant, and less than one, which confirms that a long-run relationship exists between the variables and hence justifies the use of the VEC model. It must be emphasized that the sign of coefficients of the normalized cointegration is interpreted in the opposite.

The null hypothesis of no autocorrelation cannot be rejected as the probability value is greater than the 5 percent significance level. This means that the model used to estimate the results of the study does not suffer from autocorrelation. The Jarque-Bera test which combines the tests of normality however indicates that the data is not normally distributed. This notwithstanding is due to the fact that the Ghanaian economy experienced a structural break during the period studied (Dramani, Tandoh & Tewari, 2012).

The findings presented in Table 3 show that electricity consumption in Ghana increased by 10.46 kWh per capita and 61.02 kWh per capita respectively in the short and the long run respectively, for a percentage increase in the rate of access. This conforms to the apriori expectation of electricity access increasing the consumption of electric power despite the low uptake of electricity power in Ghana. However, Blimpo & Cosgrove-Davies (2019) found that increasing electricity access alone is not enough for people to actually connect to it. They explained that other economic and social factors contribute to the decision of the individual to consume electricity if they have access. The majority of individuals have access to electricity but still cannot connect because they simply cannot afford it. Mensah (2016) also asserted that erratic power outages make power from the electricity grid unattractive and some consumers will rather invest in self-generation for their power needs. Resolving these challenges will enhance
electricity consumption and make the increase in access rate more profitable in Ghana.

Table 3 also shows a fall of 8.59 kWh per capita in electricity consumption when national income increases in the short run but does not influence it in the long run. This result contradicts the expected sign but can be explained by the fact that higher income levels mean the country is advancing with better productive technologies which improve efficiency and reduce the consumption of electricity (Bhattacharyya, 2011).

The human development index (HDI) only influenced the consumption of electricity in the long run. This is explained by the fact that development takes time to manifest and it is mostly a long-run phenomenon. It shows that an increase in Ghana’s HDI improved the consumption of electric power by 13.1 kWh per capita. This finding presupposes that advances in Ghana’s development will improve its electricity infrastructure, increase access rate and enhance electricity consumption.

The population of Ghana had a positive effect on electricity consumption in both the short and the long run. The result shows that a percentage increase in Ghana’s population increased the consumption of electricity by 32.50 kWh per capita and 5.47 kWh per capita respectively for the short and the long run. This is expected as increases in population increase the total demand and load on electricity. In the end, more electricity would have to be consumed with each increase in population.

5. Conclusion

This study concludes that there is a positive nexus between electricity consumption and electricity access in Ghana despite the low uptake and erratic power supply. Again, increases in national income reduce electricity consumption while increases in HDI and population increase it. Despite the positive nexus between Ghana’s electricity access and its electricity consumption, efforts must be made to eliminate other barriers that prevent Ghanaians from actually connecting to power. It is also recommended that policies that encourage education among women must be enhanced to reduce their childbearing years, reduce population growth and reduce pressure on
electricity infrastructure. The use of efficient electric appliances must also be encouraged to save electricity and increase productivity.

References


World Bank Development Indicators (2020).

