

The Impact of Material Wellbeing and Safe Drinking Water on Quality of Life in Africa

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Abstract: The paper examines the impact of access to safe drinking water and material wellbeing on quality of life using a panel sample of twenty three (23) African countries for the period of 2008 – 2014. The paper employed fixed effects and random effects model to estimate the variables under investigation. The Hausman specification test of 1978 was applied to select the appropriate and better model for the estimation where fixed effects estimation was chosen over random effects estimation. The findings revealed that material wellbeing and access to safe drinking water had positive and statistically significant impact on quality of life in the countries over the period of the study. Consequent upon the major finding, the following recommendations are given; the need for the countries to ensure enabling environment such as constant supply of electricity, good transportation systems, law and order enforcement, etc. to smooth the affairs of businesses and attract more foreign investors to the region so that more output would be realized and a long way improving quality of life.

Keywords: Quality of life, material wellbeing, access to safe drinking water, Africa.

1. INTRODUCTION

Gross Domestic Product per capita is the most commonly used indicator to compare wealth among countries and is a measure of well-being and development exclusively based on material wealth. Furthermore, insufficient income is merely one dimension of underdevelopment, so development cannot be understood by only taking into account economic performance. Attempts were made in the 1970s to construct socioeconomic indicators as an alternative to GDP per capita, due to its incapability to address distributional aspects of output as well as social and human welfare dimensions (Berenger and Verdier-chouchane, 2007). In the process of constructing alternative indices, Morris (1979) developed the Physical Quality of Life Index (PQLI) that takes into account life expectancy, infant mortality, and literacy. United Nations Development Programme (UNDP) launched Human Development Index in 1990 to capture the broad concept of human development concept viz. life expectancy, educational level and GDP per capita (Berenger and Verdier-chouchane, 2007).

However, quite numbers of empirical studies were carried out in relation to material wellbeing, safe drinking water and quality of life. Notable among these studies were focused on the impact of gross domestic product (GDP) on quality of life: Mohamad and Padmini (2015); Deb (2015); Khodabakhshi (2011); Morote (2010); Weisbrot and Ray (2011); Easterly (1999); and Subramanian (2013); and access to safe drinking water on quality of life: Bahadur (2014) and Fogden (2009). The major gap common with these studies is that they had been conducted on European and/or Asian countries. Thus, these continents are entirely different from Africa in terms of human development index and infrastructural development. This study therefore seeks to contribute to this growing literature and fill the aforementioned gap by investigating the impact of material wellbeing and safe drinking water on quality of life in Africa over the period of 2008 to 2014. Therefore, the paper intends to answer questions such as: Do material wellbeing and access to safe drinking water influence quality of life in Africa. The paper is organized as follows: following this introduction is section 2 that contains conceptual as well as empirical literature reviews. Section 3 discusses the method of data collection and methodology. The major findings are presented in Section 4 and section 5 reports the conclusions and recommendations.

2. LITERATURE REVIEW

This section shall present and discuss the concepts of quality of life and access to safe drinking water; theories of quality of life and empirical literature.

2.1 Conceptual Issues:

2.1.1 *Quality of Life:*

The concept of quality of life has received the attention of many scholars and researchers but they define it differently. According to Berenger and Verdier-Chouchane (2007) quality of life has been viewed as a vague multidimensional concept that has to do with all aspects of individual life.

Moreover, quality of life is a complex multifaceted construct that requires multiple approaches from different theoretical angles. According to Berenger and Verdier-Chouchane, (2007), quality of life was justified by empirical support as the index that measures “the end” rather than “the means” as does the GDP per capita. Quality of life comprises level of achieved satisfaction in basic materialistic, physiological and emotional needs. These emotional needs refer to being satisfied with freedom, justice and opportunities for the complete development of individual capabilities.

2.1.2 *Access to Safe Drinking Water:*

According to World Bank (2015), access to safe drinking water refers to the percentage of the population using an improved drinking water source. The improved drinking water source includes piped water on premises (piped household water connection located inside the user’s dwelling, plot or yard), and other improved drinking water sources (public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, and rainwater collection. In other word, access to an improved water source refers to the percentage of the population using an improved drinking water source.

2.2 Theoretical Framework:

The theoretical framework underpinning the factors that determine quality of life were broadly categorized into three viz. subjective theories, objective theories, and objective -subjective theories of welfare.

Subjective Theories of Welfare:

Subjective theories hold that something is good if and only if that thing rhymes with the attitudes of that person. These theories have not yet reached consensus on specifying the relevant pro-attitude, thus the following are identified as its elements: endorsement, enjoyment, happiness, satisfaction, desire, and preference. It had been categorized into preference satisfaction theories, actual preference satisfaction theory, informed preference satisfaction theories, and testimonial model.

Objective Theory of Welfare:

Objective theories, on the other hand, do not require a connection between a person's pro-attitudes and the goods that promote a person's welfare. These theories suggest normative ideals of what it takes for life to be good for the person whose life it is. It is against this background that certain goods were found to be contributing catalysts that make a person’s life better (Bognar, 2005). More so, objective theories are also known as "objective list" or "substantive goods" theories. Objective theories suggest that something is good (or bad) for a person in virtue of some characteristics of that thing itself, independently of the person's pro-attitude or con-attitudes toward that thing. It is the kind of thing that is not only worthy for human beings to demand but also prosper standard of living of human beings and that rational being take care off.

Subjective - Objective Theories:

It is clearly evident that from the foregoing theories, quality of life is based on either social or economic indicators that reflect the extent to which human needs are met or subjective well-being which is self-reported in terms of happiness, pleasure, fulfillment, life satisfaction, etc. Therefore, this is the best theory of well-being that combines objective and subjective approaches of quality of life (Costanza, *et al.* 2007). This category comprises theories of welfare that focus on both subjective and objective dimensions of quality of life. It has been categorized into hedonist and human ecological theories.

However, subjective theories focus on self-reported levels of happiness, pleasure, fulfillment, life satisfaction, etc. that are difficult to quantify and there is paucity of data on Africa. Therefore, the theoretical framework of this research work was based on the objective theory of welfare. The theory provides the foundations of Physical Quality of Life Index, the Human Development Index and the Index of Social Progress. It emphasizes on the means that enhance well-being of people irrespective of their attitudes towards such means. Therefore, the objective theory was hereby adopted to examine the impact of material wellbeing and access to safe drinking water on quality of life in selected African countries.

2.3 Empirical Literature Review:

There are significant numbers of empirical studies focusing on the impact of material wellbeing and access to safe drinking on quality of life. These studies are abound, to mention but a few: Mohamad and Padmini (2015); Deb (2015); Khodabakhshi (2011); Morote (2010); Weisbrot and Ray (2011) and Subramanian (2013).

For instance, Weisbrot and Ray (2011) examined the impact of economic growth on social indicators for 193 countries over the past 50 years which are divided into three periods: 1960 – 1980, 1980 – 2000 and 2000 – 2010. The variables were HIV/AIDS, adult, infant and child mortality, life expectancy, expenditures on education, among others. The study discovered that after slowdown in economic growth and in progress on social indicators during the period (1980 - 2000) period, there had been a recovery on both economic growth and in progress on social indicators for many countries; these social indicators are life expectancy, adult, infant and child mortality, and education.

Using cross sectional dataset Zhang, Li, Fong, and Thumboo (2009) investigated the impact of health literacy on health related quality of life and utility assessment among patients with rheumatic diseases applying multiple linear regression models, chi-square and Mann Whitney U non-parametric test to compare socio-demographics and health related quality of life in patients with low or adequate health literacy; Spearman's correlation and partial correlation are used to study the relationship among health-literacy, health related quality of life, and utility scores. Health literacy was proxied by the rapid estimates of adult literacy in medicine and was characterized as low or adequate. The results showed that patients with adequate health literacy had significantly higher education levels, better dwelling status, lower disease activity and better physical functioning. Moreover, there was significant although weak correlation between health literacy level and physical functioning. After adjustment, health literacy was shown to independently explain 3.7% of the variance in the physical functioning score. Nevertheless, there was no impact of health literacy on utility assessment or other health related quality of life.

Using panel dataset of eighty one (81) indicators covering up to four (4) time period viz. 1960, 1970, 1980 and 1990 through seemingly unrelated regression (SUR) estimation in levels and fixed effect estimator Esterly (1999) examined the impact of economic growth on quality of life. The variables of choice were based on education and health, amongst others. The empirical evidences from Seemingly Unrelated Regression (SUR) estimator revealed that GDP per capita had significant positive impact on quality of life for thirty two (32) out of eighty one (81) quality of life indicators; while fixed effect estimator discovers that growth had significant positive impact on the quality of life for six (6) out of sixty nine (69) quality of life indicators.

In Indian study, Khodabakhshi (2011) investigated the relationship between GDP and human development indices adopting the Indices of United Nations Development Programme, using GDP or income as the dependent variable and other indicators as independent variables including long life, health and education over the period 2005 - 2010. The findings disclosed that education index had greatest impact on Human Development Index following by GDP per capita while life expectancy had lower impact on human development index. Also, Subramanian (2013) investigated the influence of economic growth on physical quality of life in India over the period of 1990 – 2004. Physical quality of life is proxied by HDI. The study revealed that growth of HDI was at faster rate than economic growth, owing to improvement in adult literacy rate, gross enrolment ratio, life expectancy, and infant mortality and maternal mortality rate, health and sanitary conditions.

In similar study, Deb (2015) examined the gap between Gross Domestic Product and human development index in one hundred and forty (140) countries during four period of time, namely, 1990, 2000, 2010 and 2013 in order to observe whether the rich countries experience different from the poor using scatter plots, Spearman's rank correlation and logit and probit regression. The results revealed there was high positive relationship between per capita GDP and human

development at the aggregate level of all countries during the four periods. On the other hand, the analysis for different income group of countries showed that the positive relationship is more adequately high in low income countries and weak in middle and high income countries in all the periods.

In another study, Bahadur (2014) empirically studied the impacts of access to infrastructure on the human development (HDI) using dynamic panel estimation of General Methods of Moments over the period 1995 - 2010 covering 91 developing countries. The human development (dependent variable) was proxied by human development index of UNDP; the explanatory variables were access to electricity, access to clean drinking water sources and so on. More so, the paper went further to use each component of HDI as dependent variable. The results revealed that all three infrastructure variables had significant positive impact on HDI. The results with regard to component of HDI (as dependent variable) access to electricity and access to clean drinking water sources had significant positive impacts only on education and health indexes; while road density had significant positive impact on the income index.

Morote (2010) studied the causality between human development, GDP and employment in two Latin American emerging countries, Mexico and Peru, using semi-annual data over the period 1970 to 2000. The study employed Walt test for Granger causality. The variables were higher education enrollments per capita, GDP per capita and employment rates. The finds pointed out that causality runs from the higher education enrollments and employment to economic growth implying that it was the rapid higher education enrollments and employment that pave the way for changes in economic growth.

In Malaysian study, Mohamad and Padmini (2015) investigated the relationship between Growth Domestic Products (GDP), Human Development Index (HDI) and poverty rate using Johansen Cointegration model and Vector Error Correction model over the period 1990 to 2012. The variables of choice were GDP proxied by GDP per capita, poverty rate proxied by poverty headcount ratio at national poverty lines (% of population) and human development index. The results disclosed that, in the long-run, HDI and GDP had a significant negative relationship while poverty rate had a significant positive relationship with the GDP. While in the short-run, it indicated that HDI and GDP had no significant relationship but poverty rate and GDP had significant negative relationship. However, the lacuna identified in the literature, to the best of our knowledge, is that there is no any research specifically conducted in Africa, in relation to, material wellbeing, safe drinking water and quality of life

3. METHODOLOGY

3.1 Sources of Data and Description of the Variables:

In estimating the impact of material wellbeing and access to safe drinking water on quality of life in the selected countries of Africa, the secondary data was used spanning the period of 2008 to 2014. The data was obtained from World Bank's World Development Indicators and United Nations Development Programme (UNDP), respectively. However, the study used purposive sampling technique to select the countries from the region based on availability of data in the region. This study employed human development index as proxy for quality of life which is consistent with the works of Morote (2010), Deb (2015), Khodabakhshi (2011), Mohamad and Padmini (2015). Material well-being is measured by real GDP per capita in U.S. dollar. Access to safe drinking water is measured as the percentage of the population using an improved water sources such as piped water on premises, public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, and rainwater collection.

3.2 Model Specification:

The relationship between the variables under investigation, access to safe drinking water, gross domestic product per capita and quality of life; for this research work are expressed in a linear econometric model as follows:

$$HDIX_{it} = \beta_0 + \beta_1 GDPK_{it} + \beta_2 AIMW_{it} + U_{it} \quad (3.1)$$

Where:

HDIX = Quality of Life

AIMW = Access to Safe Drinking Water

GDPK = Gross Domestic Product Per Capita

$\beta_0 - \beta_2$ = Coefficients of the independent variables

i = The Cross Section Unit

u_i = Stochastic Disturbance Term

t = Time of Observation

3.3 Technique of Data Analysis:

This study employs panel data approach to analyze the impact of material wellbeing and access to safe drinking water on quality of life in Africa. The paper uses the fixed effects model and the random effects model for the estimation. The choice of either to use, the fixed effects model or the random effects model, is determined by the outcomes of F-test and Hausman (1978) test.

4. RESULTS AND DISCUSSIONS

The paper proceeds to analyze and discuss the results as follows:

Table 4.1 displays the results of fixed effects and random effects estimations as well as the diagnostic test of Hausman specification test of 1978 for appropriate and best model selection.

Table 4.1 Regression Results of Fixed Effects and Random Effects Estimations

Dependent Variable: Quality of Life				
Independent Variables	Coefficient Estimates and t-statistic			
	Fixed Effects Regression		Random Effects Regression	
Material Wellbeing	0.041075	(14.80)***	0.003668	(2.09)**
Access to Safe Drinking Water	0.015357	(1.86)*	0.004602	(1.99)**
Constant	0.305564	(6.91)***	-0.054785	(-2.44)**
R – Square	0.99		0.99	
F – Statistics	74811.00***		9925.47***	
Hausman Specification Test				
Test Summary	Chi-Sq. Statistic		Chi-Sq. d.f.	
Cross section random	111.152629***		7	
Significant at 1% (***), 5% (**) & 10% (*)				

Source: author’s computation using Eviews version 7.0.

From the fixed effects regression result in Table 4.1, it is evidently presented that access to safe drinking water and gross domestic product per capita have positive impact on quality of life at 10 and 1 percent levels of significance, respectively. Therefore, the magnitude of the impacts differs by considering their coefficients. That is, a 1 percent increase in gross domestic product per capita and access to safe drinking water will lead to 4.1075 and 1.5357 percent increase in quality of life, respectively. Furthermore, the F – statistic shows that the model is adequate even at 1 percent level of significance. More so, the analysis of Table 4.1 revealed that the overall model is well fitted as the independent variables explain about 99.9 percent influence on the dependent variable. Moreover, the result of diagnostic test was depicted in Table 4.1 In order to perform robustness check of the estimated results. The value of Hausman test is 111.152629 which is significant at 1 percent level; implying that fixed effects model is consistent and more appropriate than random effects model. This is because the P – value is significant leading to rejection of the null hypothesis and the acceptance of alternative hypothesis that fixed effects model is more appropriate and better choice for the analysis than random effects model.

Moreover, the coefficient (0.041) of gross domestic product per capita proxied for material wellbeing displayed a positive impact on quality of life and significant at one percent level implying that material wellbeing is positively associated with quality of life over the period of study which is in accordance to a priori expectation. This is logical because the higher the

level of material wellbeing the higher the quality of life. This finding is in harmony with the findings of Khodabakhshi (2011) for India; Deb (2015) for one hundred and forty (140) countries comprising those categorized with low, middle and high human development index; but Mohammed and Padmini (2005) for Malaysia reported significant negative impact on quality of life. Similarly, the coefficient (0.015) of access to safe drinking water showed a positive relationship with quality of life at 10 percent level of significance which is in line with a priori expectation of the study. It revealed that a one percentage increase in access to safe drinking water bring about 1.54 percentage increase in quality of life. This establishes that material wellbeing significantly determine quality of life in the selected counties of Africa. This is because accessibility to good drinking water protects people from so many diseases especially contagious that deteriorate health conditions and hence quality of life. This finding corroborates the findings of Bahadur (2014) for ninety one (91) developing countries who reported a significant positive relationship between access to safe drinking water and quality of life.

5. CONCLUSION AND RECOMMENDATIONS

On the basis of the findings of this study, the following conclusions are drawn: It was revealed that material wellbeing and access to safe drinking water have positive and statistically significant impact on quality of life in the African countries. Therefore, the study revealed the relative importance of material wellbeing and access to safe drinking water vis-a-vis quality of life and the magnitudes of their impact on quality of life. However, based on the findings of this study which displayed that material wellbeing and access to safe drinking water have statistically positive relationship with quality of life; the following recommendations are drawn:

Production of goods and services should be encouraged while income inequality should be reduced in order to improve quality of life. This can be done by encouraging private investors to establish more industries through subsidizing raw materials, providing more infrastructural facilities, giving tax holiday, and etc. It is also recommended that enabling environment (constant supply of electricity, good transportation systems, law and order enforcement, etc.) should be provided to smooth the affairs of businesses and attract more foreign investors to the region so that more output would be realized and a long way improving quality of life.

The study therefore recommends boosting infrastructural facilities which a long way provide more access to safe drinking water in terms of construction of more boreholes, wells, public taps or standpipes, protected springs, tube wells and water reservoir; and extension of the electrification coverage in the region which can be used as machinery for pumping water to the dwelling areas. So that people would not be using contaminated water for domestic purposes which adversely affect their quality of life.

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APPENDIX - A

List of Selected African Countries:

1	Algeria	9	Egypt	17	Senegal
2	Angola	10	Ghana	18	South Africa
3	Benin	11	Kenya	19	Sudan
4	Botswana	12	Mauritius	20	Tanzania
5	Cote d'Ivoire	13	Morocco	21	Togo
6	Cameroun	14	Mozambique	22	Tunisia
7	Congo (Democratic Republic of Congo)	15	Namibia	23	Zambia
8	Congo	16	Nigeria		