

## **The Impacts of Zakat and Knowledge on Poverty Alleviation in Sudan: An Empirical Investigation (1990-2009)**

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Poverty, ignorance, and sickness constitute the main threats to development in the Less Developed Countries (LDCs). In spite of the efforts exerted to reduce poverty and inequality, poverty is still widespread in Sudan. This study aimed at examining from an empirical point of view, the roles of zakat and knowledge in reducing poverty in Sudan during the period (1990-2009), using data collected from the Central Bureau of Statistics (CBS) and Abdelmawla (2010). Two policy variables are incorporated in the empirical model namely, the percentage spent on poor out of total zakat funds and educational attainment (proxy for knowledge). By applying the Ordinary Least Squares (OLS) technique, the results obtained signify that zakat and educational attainment impact significantly at the 1% level on reducing poverty in Sudan. The study recommends increasing educational attainment rates and improving the quality of education, which requires among other things, increasing expenditure on education at all levels, beside the care for adult literacy classes. In addition to that, raising the percentage spent on the poor out of total zakat funds is highly recommended to reduce inequality in the distribution of income. Income support should particularly be used for the part of the population with special needs.

### **1. Introduction:**

Poverty is an extremely complex and multidimensional phenomenon. A comprehensive definition of poverty was given in the World Summit for Social Development held in Copenhagen (March 1995) indicating that “Poverty has various manifestations including lack of income and productive resources sufficient to ensure sustainable livelihood, hunger and malnutrition, ill health, limited or lack of access to education and other basic services, increased morbidity and mortality from illness,

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homelessness and inadequate housing, unsafe environments, and social discrimination and exclusion. It is also characterized by lack of participation in decision-making, as well as in civil social and cultural life”.

Anti-poverty programs can be broadly classified into two strategies: (a) Indirect Strategies: that formulate a macro-economic policy framework to ensure sustainable growth, higher employment, higher per capita income, and eventually reduce poverty; and (b) Direct Strategies: that target the underprivileged population and provide them necessary assistance to ensure credit access, improve health conditions, increase literacy rate and ultimately eradicate poverty (Pramanik, 1993).

The Islamic economy identifies individual differences among people as each person is endowed with different types and levels of human abilities. Thus, even though individuals are provided with equal opportunities, the economic status of two individuals may not be equal. Therefore, poverty cannot be alleviated simply through income redistribution or ensuring equitable opportunities for all. An Islamic approach to poverty alleviation would ideally involve a holistic approach including a set of antipoverty measures: (a) increasing income level with pro-poor programs, (b) achieving an equitable distribution of income and (c) providing equal opportunities for all social segments (Hassan, 2006).

Poverty is still widespread in Sudan in spite of the efforts exerted to reduce its incidence. According to the more recent survey; the National Baseline Household Survey (NBHS, 2009), 46.5% of the population of Northern Sudan is found to fall below the poverty line, with 26.5% of the urban population and 57.6% of the rural population. Out of the population of Southern Sudan, 50.6% is found to fall below the poverty line, with 24.4% of the urban population and 55.4% of the rural population.

The ultimate objective of this study is to examine from an empirical point of view, the roles that could be played by zakat and knowledge in reducing poverty in Sudan. A multiple regression model is specified using the percentage spent on poor out of total zakat funds and educational attainment as explanatory variables and the incidence of poverty (the Head Count Index) as the dependent variable. The study

employed data covering the period (1990-2009), which are collected from the Central Bureau of Statistics (CBS) and Abdelmawla (2010). The hypotheses of the study can be summarized as follows: Both zakat and educational attainment have negative impacts on the incidence of poverty in Sudan.

Poverty reduction is one of the main objectives of development policies in the LDCs. In particular, poverty alleviation is the first goal of the Millennium Development Goals (MDGs).

By applying the Ordinary Least Squares (OLS) technique, the results of the study indicate that zakat and educational attainment impact significantly on reducing poverty in Sudan. The elasticity of the head count index with respect to changes in educational attainment and zakat are estimated at (- 0.94) and (- 0.26), respectively. The study recommends increasing educational attainment rates and improving the quality of education through increasing expenditure on education at all levels, beside the care for adult literacy classes. Raising the percentage spent on the poor out of total zakat funds is highly recommended to reduce inequality in the distribution of income. Income support should particularly be in favour of the population with special needs.

The remainder of the paper is organized as follows: Section (2) reviews literature, while section (3) gives a background about the poverty profile in Sudan. Section (4) illustrates the methodology and data used in the study, while section (5) discusses the empirical results and policy implications of the findings. Finally, some concluding remarks are reported in section (6).

## **2. Literature Review:**

Poverty usually refers to deprivation of wellbeing. There are many factors that cause poverty and various approaches to explain the concept. The study conducted by Rowntree (1902) has been described as the first scientific study on poverty. He defined the poverty line by estimating the monetary requirements for a nutritionally adequate diet together with estimated needs for clothing and rent. Those whose incomes fall below this line are classified as being in primary poverty. Furthermore, households who are seen to be living in “obvious want and squalor”

were classified as being in secondary poverty, despite being above the defined poverty line.

The European Commission definition adopted in (1985) states that "the poor shall be taken to mean persons, families and groups of persons whose resources are so limited as to exclude from the minimum acceptable way of life in the member states in which they live".

Poverty can be defined as a failure to achieve certain minimal or basic capabilities, where "basic capabilities" are the ability to satisfy certain crucially important functionings up to certain minimally adequate levels (Sen, 1993).

Ravallion (1998) defined the poverty line as the "minimum cost of the poverty level of utility". To give this definition a more practical meaning, Ravallion (1998) suggested two approaches for measuring the poverty line: one is the food Energy Intake method, which essentially amounts to a nutritionally based poverty line; the other is a "cost of basic needs" line, either starting with food and adding non-food components, or starting with a list of basic needs and costing them.

The World Bank (2000) defined poverty as "Lack of resources, bad social relations, insecurity and vulnerability, low self-confidence, and powerlessness ... Income poverty can be distinguished from health poverty, education poverty, and security poverty".

According to Hassan (2010), poverty in Islam is defined as a state whereby an individual fails to fulfill any of the five basic human requirements of life namely, religion, physical self, intellect or knowledge, offspring, and wealth. Along the same line, Khan (2013) argued that poverty in Islam is defined by five groups of activities and things which make up the human needs namely, religion, physical self, intellect or knowledge, offspring, and family and wealth. The fulfillment of these needs is considered one of the basic goals of Islam. So, poverty in Islam is related to the concept of the necessities mentioned above. An individual is considered poor if he does not possess sufficient necessities to fulfill his basic needs in each of the five foundations for good individual and social life.

There are various instruments through which poverty can be reduced or eliminated. These include among others, economic growth, micro-finance, expenditure on education and health, zakat, takaful (solidarity), good governance and Waqf. With regard to the relationship between public policy and poverty reduction, Kakwani (1993) argued that for different classes of poverty measures, any policy that aims at increasing the mean income of the population would reduce poverty for a given level of income distribution. On the other hand, he has also shown that, under mild conditions and for a wide class of poverty measures, greater inequality leads to greater poverty. Since any given public policy that aims at changing the mean income of the population may also change income distribution in either direction, the final impact of such policy on poverty can only be assessed from an empirical investigation.

The World Bank (2004) argued that despite the fact that Governments devote about one third of their budgets to health and education, very little of it goes to the poor. Even if funds are dedicated to the poor people, the weak systems of incentives and delivery largely explain the lack of a consistent relationship between changes in the structure of public spending and poverty.

Using econometric methods, Dollar and Kray (2001) examined the impact of macroeconomic stability and fiscal discipline on poverty by taking into consideration certain components of public policy such as expenditure on health and education. They took China, India and some other large developing countries as case studies for different periods, namely, 1970s, 1980s, and 1990s. Their findings suggest that many supposedly “pro-poor” policies such as public expenditure on health and education do not have any significant impact on the income of the poor. They argued that social spending in developing countries often benefits the rich and middle classes more than the poor. Therefore, a higher share of social spending on items such as health and education will not be reflected in higher incomes for the poor. In contrast, income of the poor seems to respond systematically to pro-growth policies such as fiscal discipline, macroeconomic stability, good rule of law and openness to international trade. They concluded that these pro-growth policies should be at the heart of any program aiming at poverty eradication.

Many countries have established micro-credit (micro-finance) programs with the explicit objective of reducing poverty by providing small amounts of credit to the poor to help them finance income-generating activities through self employment (World Bank, 1996). Grameen Bank in Bangladesh, founded in 1976 as a project and then transformed into a specialized bank in 1983, is the best-known micro-credit program. By 1994, the Bank had mobilized more than two million members, 94 % of them were women, and achieved a loan recovery rate of more than 95 % (Quoted in Sayed, 2006).

Zakat is a levy of 2.5% on wealth for the amelioration of all forms of social security and charity in an Islamic community. Zakat as an instrument of equitable distribution that purifies wealth from selfish covetousness and brings about equality and social harmony out of goodwill, also causes wealth to increase manifold. These conjoint blessings of social purification and economic enhancement of wealth are seen as automatic socio-economic multipliers for an economy where poverty and needs persist, and where the natural endowments of an agrarian economy cause depressed earnings. The economic causes of poverty, rather than the cause of indolence, are the targets for alleviation through Zakat, just as it is also a social spending to secure the welfare of the old, the sick and the needy. An important socio-economic area where hardly any work has been done in the literature on Zakat is the positive role it can play in poverty alleviation by removing distress and below subsistence wages for non-wage labour. The result of this positive effect of Zakat appears to be the generation of productive economic activity in the non-wage sector. If that is indeed the poverty alleviating effect of Zakat on low wage labour, then it should certainly be adopted as a serious socio-economic policy instrument and institution in economies where non-wage labour abounds (Choudhury and Hassan, 2001).

Zakat, which is one of the five pillars of Islam, can play a role in policies of redistribution of assets and opportunities, thereby reduce poverty. The impact of Zakat towards the poor is described as follows: zakat must be given as a direct transfer payment to the poor. The hope is the poor are sufficient enough to take care of their basic needs. Accordingly, they are able to establish their own means of livelihood, utilizing a combination of their own human and material resources by zakat given. The zakat distribution, therefore, not only raises the income of the poor and their capital but also raises their ability to make

responsible decisions concerning the use of their income. The improvement in the income of the poor will lead to increase in their consumption of goods and services, and raising their opportunity to access educational facilities, health, nutrition, and in general, improvement in the welfare of poor families. These improvements are commonly a major requirement in increasing the productivity of the poor (Kusuma and Sukmana, 2010).

Hassan (2014) argued that Islamic principles of poverty alleviation are based on the Islamic views of social justice and the belief in Allah Almighty. Islamic approach involves a holistic approach with set of anti-poverty measures. Poverty Eradication Scheme of Islam includes positive measures, preventive measures, and corrective measures. The positive measures include income growth, functional distribution of income, and equal opportunity, while the preventive measures include control of ownership and prevention of malpractice. The instruments of the corrective measures are compulsory transfer (Zakat), recommended transfer (charity), and State responsibility.

One of the successful examples in poverty reduction in the Case of Tunisia. According to (Friedman, 2010; World Bank, 1995), Tunisia reduced the proportion of people living on less than \$1 per day from 5.9% in 1990 to 1.4% in 2005—a 76.3% drop. The country's consistent economic growth of about 5% over the past two decades and long-standing commitment to social and physical development have played an important role. Commitment to long-term infrastructure development across rural and urban areas supported better distribution of the benefits of growth. The promotion of irrigated farming covering more than 4,000 square kilometres for producing olive oil, grains and citrus fruits is also vital. Agricultural development, especially in rural areas, promoted self-sufficiency, generating employment and improving living conditions. Over the years, even during fiscal austerity, the government protected the public expenditures in social sectors, including welfare for the vulnerable and marginalized. The government has several safety nets, including: food subsidies targeted to the poor through self-selection mechanisms using quality differentiation; direct transfers, in cash and kind, targeted to the needy (the elderly, the disabled, schoolchildren and needy families); and public works programs that provide short-term jobs for unskilled workers, in both urban and rural areas, through self-targeted mechanisms, such as setting wages below the minimum wage and locating the work sites in predominantly poor areas. These interventions have helped alleviate

poverty. But despite the progress, the interventions need better targeting and the programs need to be implemented more efficiently.

### **3. Poverty Profile in Sudan:**

In spite of the efforts exerted to reduce poverty and inequality in the distribution of wealth, poverty is still widespread in Sudan as the case in many African and Arab countries. A number of surveys and studies have been conducted to raise the issues of poverty and inequality in Sudan, some of which are reviewed in what follows.

Using data of the 1992 Poverty Survey, Nur (1992) calculated the poverty indicators for urban and rural areas of Sudan on the basis of both income and expenditure. The results of his study reveal that, with the exception of the relative deprivation indices, all other poverty measures computed on the basis of expenditure in urban areas are smaller than those obtained on the basis of income. The head count index was estimated at 74.4% with expenditure and at 83.0% with income. With regard to the poverty-gap index, the average income and average expenditure of the poor are short of the poverty line by 74% and 60%, respectively. The Gini-coefficient which captures the degree of inequality, was estimated at 0.7 for income and at 0.8 for expenditure. Regarding rural areas, Nur (1992) observed that all poverty measures computed on the basis of the expenditure are smaller than those computed on the basis of income. On the basis of expenditure only 61.3% of the rural people are poor, and their average income is short of the poverty line by 58.3%. Furthermore, the Gini-Coefficients with expenditure and income were estimated at 0.551 and 0.527, respectively.

By adopting the "before and after" approach, Ali (1994) examined the effect of Structural Adjustment Programs (SAPs) and liberalization policies on poverty in Sudan. The study compared the trends in poverty between three periods, namely 1968-1978, 1978-1986, and 1986-1993, where the year 1978 marked the era before the implementation of the SAPs. The results revealed that poverty in Sudan has increased rather substantially between 1978 and 1993. The number of the poor as a proportion of total population (i.e. the head-count index) has increased from 52% in 1968 to 54% in 1978, to 78% in 1986, and further to 91% in 1993. The study concluded that the SAPs have a direct negative effect on the poor in Sudan. The compound impact of SAPs (1978-1985) and



the liberalizations policies (1990-1993) was to increase the head count index by 29%, 54% and 33% in rural areas, urban areas, and the whole of Sudan, respectively. Furthermore, the poverty gap index increased by 28%, 26% and 38% in rural areas, urban areas, and the whole of Sudan, respectively.

Ali (2004) adopted a Millennium Development Goal (MDG) framework to explore the question of the required growth and investment rates to reduce poverty by half over two alternative time horizons (10 and 15 years starting 2005) in post-conflict Sudan. The results of his study reveal that the required GDP growth rate ranges between 7.9 to 6.2 percent per annum with corresponding required investment/GDP ratios of 0.34 and 0.26 for the shorter and longer time horizons, respectively. Southern Sudan requires an investment rate of about 157% of its GDP, while the investment rate for the North is about 20% of its GDP. The above financing requirements for a country emerging from a long civil war, and aiming at reducing poverty by half within a reasonable time horizon, imply that development policy needs to be anchored on a long-term comprehensive development strategy. The major challenge for the design of relevant development policy in the context of such a strategy is obviously that of increasing the current, rather modest, investment rate. Such policies would require enhancing the domestic saving capacity of the economy, attracting foreign direct investment, and mobilizing foreign assistance. But the design of relevant policies will also need to recognize the constraints, or opportunities, already agreed to in the context of the various agreements and protocols signed in the context of the peace process.

Sayed (2006) assessed the impact of poverty alleviation programs of the NGOs working in Sudan, with reference to those implemented by the Agency for Co-Operation and Research in Development (ACORD) in eastern Sudan, where poverty is known to be widespread. Preliminary statistical results obtained suggest that there is a statistically significant difference between the mean income of the beneficiaries and that of non-beneficiaries in favor of the former group, suggesting that the intervention program implemented by ACORD has led to a significant improvement in the incomes of at least some of the beneficiaries. The Gini coefficients are estimated at 0.42 and 0.44 for the beneficiaries and non-beneficiaries, respectively, which are not significantly different from each other. Based on income and expenditure as welfare indicators

as well as the objective and subjective poverty lines, Sayed (2006) calculated the incidence, depth and severity of poverty indices. On the basis of the objective poverty line, the three poverty measures for the beneficiaries were estimated at 76%, 40% and 26%, respectively, while for the Non-beneficiaries they were 82%, 43% and 27%. On the other hand, using income as a welfare indicator the three measures for the beneficiaries were estimated at 70%, 36% and 22%, respectively, while for the non-beneficiaries they were 92%, 53% and 38%. On the basis of the subjective poverty line, with expenditure as a welfare indicator, the three measures for the beneficiaries were estimated at 78%, 42% and 27%, respectively, while for the non-beneficiaries they were 84%, 46% and 29%. On the other hand, with income as a welfare indicator, the three measures for the beneficiaries were calculated at 72%, 38% and 24%, respectively, while for the non-beneficiaries they were 94%, 57% and 39%.

Mahran (2007) made an attempt to identify the most promising public policy and related policy tools for accelerated poverty reduction in Sudan over the period (1971-2002). The analysis focused on public policies that more likely spur economic growth, improve income distribution, and reduce poverty. In addition to investment, the public policy variables considered in the analysis include government current expenditure, development expenditure, and expenditure on social services, while development expenditure is also disaggregated according to economic sector. The results for the period 1971-2002 suggest that with the exception of investment and government current expenditure, all other public policy variables considered in the analysis have had no significant effect on growth and hence on poverty reduction. These results are attributed to a host of problems that the economy has encountered during the last three decades, which culminated in its dismal performance. Based on these results, it is argued that more attention should be given to investment with emphasis on industry, a potentially more promising sector for growth. With carefully articulated forward and backward linkages between different sectors, industrial development could play a pivotal role in overall growth and in poverty reduction. Given widespread poverty, this role could be even more important for balanced regional development, which is vital in any meaningful strategy that aims at reducing widespread poverty. The emerging oil sector, together with adequate and reliable infrastructure, could play an instrumental role in this process. It is also observed that all

poverty indices are more responsive to inequality than to income growth. As such, public policies geared toward poverty reduction should focus more on improving income distribution.

The Central Bureau of Statistics of the Republic of the Sudan conducted the National Baseline Household Survey during May and June 2009 to assess the current living standards of the population. While consumption is only one dimension of welfare, it is arguably an important one that shows whether an individual has enough monetary resources to meet his needs. The poverty line for Northern Sudan was calculated at 113.8 SDG per person per month. 46.5% of the population of Northern Sudan is found to fall below the poverty line, with 26.5% of the urban population and 57.6% of the rural population falling below the poverty line. Poverty gap and severity of poverty in Northern Sudan are estimated at 16.2% and 7.8%, respectively. Khartoum is the region with the lowest poverty incidence, followed by Northern. Eastern and Central rank third, while Kordofan and Darfur are the poorest regions. Poverty levels vary greatly by state. The incidence of poverty ranges from 26% in Khartoum to 69.4% in North Darfur. Table (1) illustrates the indicators of poverty in the Northern States of Sudan.

The Southern Sudan Center for Census, Statistics and Evaluation (SSCCSE) conducted the National Baseline Household Survey (NBHS, 2009). The poverty line for Southern Sudan was calculated at 72.9 SDG per person per month. Out of the population of South Sudan, 50.6% is found to fall below the poverty line, with 24.4% of the urban population and 55.4% of the rural population. The Greater Bahr Al Gazal region is the poorest among the three regions, with 61.6% of the population classified as poor, while the Greater Upper Nile and Greater Equatoria regions have remarkably similar levels of poverty of 43.7% and 45.2%, respectively. Poverty levels vary greatly by State. The incidence of poverty ranges from one fourth in Upper Nile to three fourths in Northern Bahr Al Gazal as shown in table (2).

**Table 1: Poverty Indices in Northern Sudan, 2009**

State	Incidence of Poverty (%)	Poverty Gap (%)	Severity of Poverty (%)
Northern	36.2	10.5	4.2
River Nile	32.2	8.8	3.5
Red Sea	57.7	24.9	13.7
Kassala	36.3	14.7	8
Gadarif	50.1	15.9	6.7
Khartoum	26	6.4	2.4
Gezira	37.8	10.1	4.1
Sinnar	44.1	14	6.4
Blue Nile	56.5	20.6	9.9
White Nile	55.5	17.6	7.8
North Kordofan	57.9	24.6	13.1
South Kordofan	60	20.7	9.4
North Darfur	69.4	27.4	14.2
West Darfur	55.6	19.8	8.9
South Darfur	61.2	24.5	12.7

**Source:** Central Bureau of Statistics (2010): National Baseline Household Survey (2009), Khartoum, Sudan.

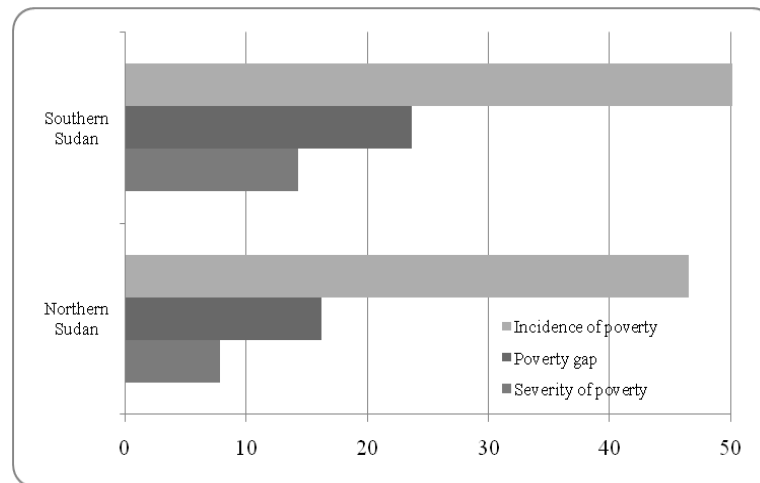
**Table 2: Poverty Indices in Southern Sudan, 2009**

State	Incidence of Poverty (%)	Poverty Gap (%)	Severity of Poverty (%)
Southern Sudan	50.6	23.7	14.3
Urban	24.4	8.8	4.6
Rural	55.4	26.5	16.1
Greater Upper Nile	43.7	19.9	11.7
Greater Bahr Al Gazal	61.6	30.5	18.8
Greater Equatoria	45.2	19.9	11.9
Upper Nile	25.7	9.8	5.0
Jongolei	48.3	22.2	13.1
Unity	68.4	34.6	21.7
Warrap	64.2	34.1	22.2
Northern Bahr Al Gazal	75.6	36.8	21.9
Western Bahr Al Gazal	43.2	17.6	9.5
Lakes	48.9	22.6	13.6
Western Equatoria	42.1	15.5	7.9
Central Equatoria	43.5	22.5	15.4
Eastern Equatoria	49.8	19.8	10.5

**Source:** SSCCSE (2010): National Baseline Household Survey (NBHS, 2009).

As shown in figure (1), all poverty indices are higher in Southern Sudan than in Northern Sudan. The severity of poverty in the South is almost as twice as that in the North.

**Figure 1: Poverty Indicators in Northern and Southern Sudan, 2009**



Source: CBS and SSCSE (2010): National Baseline Household Survey (2009), Khartoum and Juba.

#### 4. Methodology and Data:

This section outlines the research methodology that will be used in the analysis of the findings. As indicated earlier, the ultimate objective of the present paper is to examine from an empirical point of view, the impacts of zakat and knowledge on reducing poverty in Sudan during the period (1990-2009). The empirical model to be estimated takes the following general form:

$$H = F(Z, E) \quad (1)$$

Where:

H: Head count index.

Z: The percentage spent on poor out of total zakat funds.

E: Educational attainment rate (proxy for knowledge).

Zakat is one of the five pillars of Islam and one of the social safety nets. Islam establishes zakat as a compulsory for all well off Muslims. According to the Quran: “The Zakat is meant only for the poor and

needy, those who collect the tax, those whose hearts are to be won over, for the freeing of human beings from bondage, for the relief of those overwhelmed by debts, for the cause of God, and for the wayfarer: [this is] an ordinance from God- and God is All- Knowing, Wise". Zakat is a unique instrument for poverty alleviation as wealth is transferred from well-off people to worse-off people. In fact, zakat can play a role in policies of redistribution of assets and opportunities, capacity building and wealth creation, and extending income support. These outcomes in turn help reduce the spread of poverty. Thus, the coefficient of the percentage of zakat spent on poor out of total zakat fund is expected to be negative.

On the other hand, knowledge is considered as a crucial input for the development, a prerequisite for employability and an instrument for fighting social exclusion. Knowledge increases the workforce productivity and hence their incomes will rise. Since income is one of the indicators of welfare, the increased incomes will help induce welfare and reduce poverty. Thus, educational attainment is also expected to impact negatively on the incidence of poverty in Sudan (Head Count Index).

Data on the variables of interest are compiled from the Central Bureau of Statistics (CBS), Khartoum, and Abdelmawla (2010). As is well known, poverty surveys at national level are conducted from time to time because they are costly. According to Elmuluthum (1999), the head count index ( $P_0$ ) in Sudan in 1986 and 1993 are estimated at 78% and 88.1%, respectively. Based on the most recent survey conducted by the CBS and SSCCSE (2009), the head count index is estimated at 46.5% for the Northern Sudan and at 50.6% for the South, the weighted average of which gives an estimated ( $P_0$ ) of 49% for Sudan. Based on the values of ( $P_0$ ) for the years 1986, 1993 and 2009 and using the growth rate of two end points, the head count index is estimated for the period under consideration since there are no time series data available. Educational attainment rate which is proxy for knowledge, is measured by the adult literacy rate (with two-thirds weight) and the combined primary, secondary and tertiary gross enrollment ratio (with one-third weight).

The next section reports the empirical results of the study.

### 5. The Empirical Results:

To accomplish the research objectives, we firstly begin with providing some descriptive statistics for the study variables as given in table (3), where (L) denotes adult literacy rate.

**Table 3:** Descriptive Statistics for the Study Variables (1990-2009)

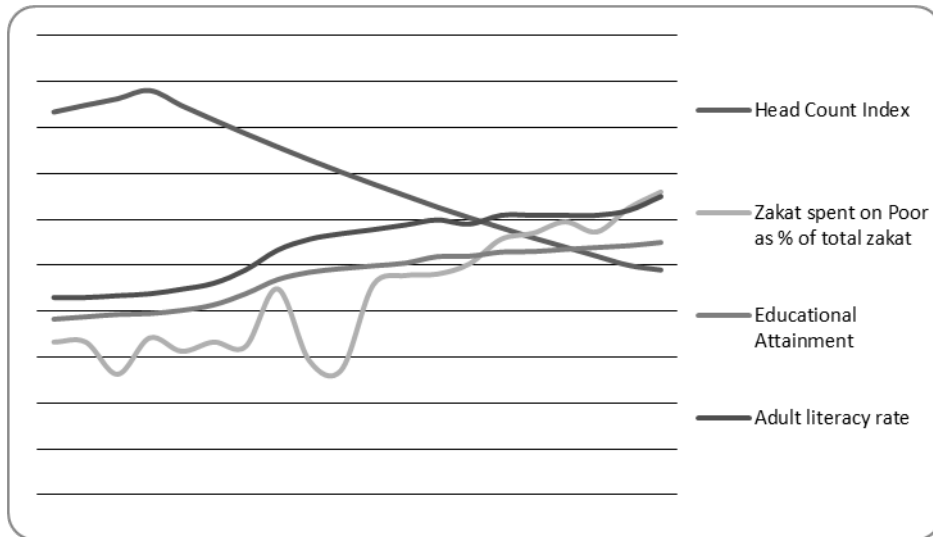
Indicator	Average	Standard Deviation (SD)	Coefficient of Variation (C.V)
H	69.1	13.3	0.192
Z	43.8	12.9	0.295
E	47.6	6.0	0.126
L	54.3	7.7	0.142

**Source:** Own Calculations based on data of the appendix.

It is clear from table (3) that the percentage spent on poor out of total zakat funds and the head count index in Sudan are highly volatile compared to other variables, with estimated coefficients of variation of (30%) and (19%), respectively. The average incidence of poverty is estimated at 69%, indicating that on average, over two third of the population are classified as poor. While the classification according to the average adult literacy rate puts Sudan in the medium category, the average educational attainment is below 50%, indicating that Sudan realized a low achievement in knowledge.

Figure (2) illustrates the trends in the study variables. It is clear that the incidence of poverty in Sudan is decreasing over time, while knowledge indicators exhibited steady improvements. The percentage spent on poor out of total zakat funds increased significantly after 1999, the period which witnessed the oil exports.

**Figure 2:** Trends in the Incidence of Poverty, Zakat and Knowledge Indicators in Sudan, 1990 – 2009



**Source:** Based on data of the appendix.

Before estimating the log linear form of the empirical model, it is important to test for the stationarity of the variables. The unit root test can be applied using the Augmented Dickey – Fuller (ADF) test, which is based on the t-statistic. The results are reported in table (4), where the figures inside the parentheses are the P-values.

**Table 4:** Results of the Unit Root Tests for the Study Variables:  
ADF t-Statistic for the First Difference

Variable	Intercept	Coefficient
Ln H	-4.20 (0.000)	-5.83 (0.000)
Ln Z	1.83 (0.089)	-5.02 (0.001)
Ln E	1.54 (0.145)	-2.83 (0.013)
Ln L	2.06 (0.058)	-3.10 (0.008)

**Source:** Own Calculations based on data of the appendix.



The results in table (4) indicate that the ADF test statistics for the coefficients of all variables are significant at 1%, indicating that these variables are stationary after differencing once, suggesting that all variables are integrated of order one.

By applying the Ordinary Least Squares (OLS) technique, we estimated the log linear form of equation (1). The estimation results are shown in table (5), where the figures inside the parentheses are the t-ratios of the estimated parameters (elasticities) and those inside the square brackets are the P-values.

**Table 5:** The Effects of Zakat and Educational Attainment on the Incidence of Poverty in Sudan, (1990-2009)

Estimated Coefficient (Elasticity) of			F-Ratio	R <sup>2</sup>	D.W.
The Constant	Z	E			
3.82 (20.53) [0.000]	- 0.26 (- 3.81) [0.000]	- 0.94 (- 5.95) [0.000]	122.3 [0.000]	0.94	1.17

**Source:** Own Calculations based on data of the appendix .

The estimation results of table (5) reveal that the explanatory variables taken into consideration explain 94% of the variations in the head count index. All the expected signs are confirmed by the empirical results, and the overall model is significant at 1% as indicated by the **F-ratio**. No autocorrelation problem exists in the estimated model. The results obtained signify that zakat and educational attainment impact significantly at the 1% level on reducing poverty in Sudan. In particular, the elasticity of the head count index with respect to changes in educational attainment and zakat are estimated at (- 0.94) and (- 0.26), respectively. Thus, an increase in educational attainment by 1% reduces poverty by 0.94%, while the increase by 1% in the percentage spent on poor out of total zakat funds reduces poverty by 0.26%. These results reveal that poverty reduction in Sudan is more responsive to educational attainment than to zakat. In fact, many studies concluded that poverty reduction is less responsive to zakat in countries with low and bottom middle income countries. It is worth noting that Sudan is classified among the latter group.

Furthermore, using adult literacy rate (L) as a proxy for knowledge instead of educational attainment, the elasticity of the head count index with respect to changes in adult literacy rate is estimated at (- 0.80), providing a strong evidence that the spread of poverty in Sudan is mainly due to high adult illiteracy rates beside inequality in the distribution of income. No other significant changes occurred in the re-estimated model as shown in table (6).

**Table 6:** The Effects of Zakat and Adult Literacy on the Incidence of Poverty in Sudan (1990-2009)

Estimated Coefficient (Elasticity) of			F-Ratio	R <sup>2</sup>	D.W.
The Constant	Z	L			
3.67 (21.16) [0.000]	- 0.28 (- 4.00) [0.000]	- 0.80 (- 5.54) [0.000]	110.5 [0.000]	0.93	1.27

**Source:** Own Calculations based on data of the appendix.

Based on the above findings, the study recommends increasing educational attainment rates and improving the quality of education, which requires among other things, increasing expenditure on education at all levels, beside the care for adult literacy classes. In addition to that, raising the percentage spent on the poor out of total zakat funds is highly recommended to reduce inequality in the distribution of income. Income support should particularly be used for the part of the population with special needs.

## 6. Concluding Remarks:

This study aimed at examining the impacts of zakat and knowledge on poverty alleviation in Sudan during the period (1990-2009). The empirical model incorporated two policy variables namely, the percentage spent on poor out of total zakat funds and educational attainment/adult literacy. By applying the Ordinary Least Squares (OLS) technique, the results obtained signify that zakat and knowledge impact significantly at the 1% level on reducing poverty in Sudan. The results further revealed that poverty reduction in Sudan is more responsive to knowledge than to zakat. The study recommends increasing knowledge

rates and improving the quality of education, which requires among other things, increasing expenditure on education at all levels, beside the care for adult literacy classes. Using Information and Communication Technologies (ICT) is of paramount importance in the educational process. Strengthening foreign relations particularly with Arab and Islamic countries can help realize this goal. In addition to that, raising the percentage spent on the poor out of total zakat funds is highly recommended to reduce inequality in the distribution of income. Policies should also give the people with special needs particular priority in the income support, medical treatment, and education.

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### Appendix

Head Count Index (H), Zakat Spent on Poor as % of Total Zakat Funds (Z), Educational Attainment (E), and Adult Literacy Rate in Sudan, 1990 - 2009

Years	(1)	(2)	(3)	(4)
	H	Z	E	L
1990	83.4	33.3	38.3	43.0
1991	84.9	33.3	38.8	43.0
1992	86.3	26.3	39.3	43.4
1993	88.1	34.2	39.5	43.8
1994	84.8	31.3	40.2	44.8
1995	81.7	33.3	41.4	46.1
1996	78.7	32.3	43.8	49.0
1997	75.8	44.9	46.9	53.3
1998	73.0	29.2	48.5	55.7
1999	70.3	27.2	49.3	56.9
2000	67.7	45.8	49.9	57.8
2001	65.2	47.8	50.5	58.8
2002	62.7	48.1	51.9	59.9
2003	60.4	50.3	52.0	59.0
2004	58.2	55.7	52.9	60.9
2005	56.0	57.0	53.0	60.9
2006	54.0	59.5	53.5	60.9
2007	52.0	57.3	53.9	60.9
2008	50.0	62.5	54.3	62.0
2009	49.0	66.0	55.0	65.0

**Sources:**

(1): Projections based on the values of 1986, 1993 and 2009 surveys.

(2): Central Bureau of Statistics, Khartoum, Sudan (2010): Statistical Series (1990-2009).

(3), (4): Abdelmawla (2010).