



# Child Healthcare Outcomes in Africa: Unlocking the Potentials of Islamic finance

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## Abstract

The objective of this study is to analyze the effects of Islamic finance on child health care in 27 African countries over the period 1975 to 2021 using data from the World Bank and World Population Review. Results of the 2SLS estimation show that Islamic finance improves child health care in Africa. Specifically: (i) Islamic finance negatively and significantly affects child overweight, (ii) Islamic finance negatively and significantly affects child mortality, (iii) Islamic finance negatively affects anaemia prevalence in children, (iv) Islamic finance negatively and significantly affects the probability of dying among children. Furthermore, our robustness analysis reveal that these effects are more pronounced in middle income than low income countries, and non-Muslim dominated than Muslim dominated countries. The findings of this study are consistent with the empirical literature and support the view that African countries can turn to Islamic finance for the promotion of child health care and the attainment of the 2030 United Nations SDGs. The study recommends the need for policymakers to put in place the necessary mechanisms for the promotion of Islamic finance such as the enacting of laws that ensures the creation of full-fledged Islamic banks, encouraging research in Islamic finance and Islamic economics.

*Keywords:* Africa, Child healthcare, Endogeneity, Islamic finance, Two-stage least squares (2SLS)

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## 1. Introduction

Child health is an important public health issue globally. The care and protection of children are vital because children are the future of a country. Their health is linked to the development of adult human capital and the national economy (Currie, 2020). This importance was further underlined in the 2015 United Nations Sustainable Development Goals having as one of its goals the significant reduction of both infant and maternal mortality by the year 2030. The third of the seventeen goals of this agenda is dedicated to ensuring healthy lives and the promotion of well-being for all. Child health can be considered as an important determinant of: a country's GDP (Amiri and Linden, 2016), since parents are able to save more money given a fall in healthcare expenditure and equally the fact that it constitutes an important part of future human capital; schooling (Khanam, 2014; Lo Bue, 2019); productivity and earnings (Viinikainen et al., 2020).

Despite the strides made in the area of health care in general and child health care in particular over the past decades, African countries are still to reach the same standards as that of high and other middle income countries. Africa is at a disadvantage compared to developed countries in terms of life expectancy and under-five mortality rates (WHO, 2021) partly explained by the fact that budget constraints bind more in poorer families, preventing them from buying more or better material health inputs such as better quality medical care and food, as well as safer housing and neighborhoods (Currie and Goodman, 2020). Consequently, of the 2.4 million newborns that died in 2020, Sub-Saharan Africa accounted for 43%, the highest neonatal mortality rate in the world (27 deaths per 1000 live births), followed by central and southern Asia (23 deaths per 1000 live births), with 36% of global newborn deaths (Macrotrends Africa, 2021; WHO, 2021).

If Africa is performing this badly with regards to child health care despite the numerous measures put in place such as increased immunization and sensitization campaigns, it only underlines the need for a paradigm shift from the current status quo. Studies such as that of Kanungo and Gupta (2021) have justified this point using the capability approach of Sen (1980), which refers to human development that offers substantive freedom to economic transaction, societal inclusion, and normative utilities of happiness and choices (Nussbaum and Sen, 1993). Specifically, these studies have stressed the role of financial inclusion of the most vulnerable (Currie and Goodman, 2020; Kanungo and Gupta, 2021). Financial inclusion can foster economic empowerment and this can lead to better

child health. This is especially true for women since it is believed that with greater power, women are in a better position to bargain for a greater share of household resources to be allocated toward expenditures that improve the health and well-being of children (DeLoach and Lamanna, 2011).

Talking about financial inclusion and capability enhancement, microfinance institutions have been praised for providing banking services such as small loans even to the most vulnerable members of the society especially in the developing world where a majority of the population is considered financially excluded by the dominant commercial banking system (Abbas and Shirazi, 2015; Beck, 2015). For instance, through microfinance, vulnerable members of the society such as women are given the opportunities to borrow, save, invest and benefit from the business activities (Zitouni and Jedidia, 2022). Thus, microfinance can positively influence child health care in at least two ways: indirectly through financial inclusion (DeLoach and Lamanna, 2011; Posso and Athukorala, 2018), which enables parents to own income generating activities permitting them to better care for their children, and directly through health-related services, such as health education, health-care financing, clinical care, training community health workers, health micro-insurance and linkages to public and private health providers (Posso and Athukorala, 2018). In as much as the place of MFIs in health care development remains largely undisputable, Banerjee and Jackson (2017) have shown that instead of improving the incomes of disadvantaged populations, conventional microfinance further worsens the situation of the poor by increasing their debt ratio. In addition, the application of interest rates and collaterals as prerequisites for the granting of loans have voluntarily or involuntarily excluded a portion of the population from the financial system. For example concerning those that are voluntarily excluded, Cameron et al. (2021) noted that due to interest charges, 20% of the poor in some Muslim-majority countries do not take part in microcredit programs. The number excluded because of their “unbankable” nature is even staggering (Beck, 2015) especially in Africa. This further reduces the possible impact of microfinance on child health care.

Islamic finance has the potential of overcoming these weaknesses, given its principles that prohibit the use of collaterals and interest rates and the fact that it seeks to achieve social justice and welfare as indicated in *Maqasid al-Shari'ah* (objectives of Islamic law) (Iqbal and Mirakhor, 2017). This mode of finance is considered as one that operates according to the principles of Shari'ah<sup>1</sup>. The practice of Islamic finance must not involve *riba*, i.e. interest rate or usury, *gharar* and *maysir*, i.e., deception and speculation respectively, and haram activities that is to say prohibited by Shari'ah (Franzoni and Ait Allali, 2018). Under this mode of finance, users have a variety of categories such as Islamic banking, sukuk, Islamic funds and takaful and equally different products which are divided into contract-based (for example *mudarabah*, *musharakah*, *ijarah*) and distribution-based (zakat, waqf, sadaqah) to choose from (Iqbal and Mirakhor, 2017).

Islamic finance has recorded a tremendous growth rate since it was formally introduced in Egypt in 1963. It is expected to reach a value of around 3.5 trillion USD by 2024 (IFSB, 2019). The large Muslim population in Africa, offers a fertile ground for the flourishing of this mode of finance, which has existed on the continent since the 1980s. Despite the itsy-bitsy share of Islamic finance investment in Africa relative to other parts of the world such as the Middle East, this mode of finance has become part and parcel of the financial system of many countries on the continent. Empirical studies in the area of child health care and finance have rather examined the effects of conventional finance on child health care (DeLoach and Lamanna, 2011; Moseson et al., 2014; Posso and Athukorala, 2018). Studies examining the effects of Islamic finance on child health care have been scarce. The few existing studies have been focused on health care in general with less attention on child health and have mostly based their analyses on some distributive-based Islamic finance products such as waqf (Baqutayan and Mahdzir, 2018) and zakat (Hasbulah et al., 2022). This study entails to fill this literature gap and is the first continent-wide analysis of the effects of Islamic finance on child healthcare especially in the context of Africa.

The contributions of this paper are as follows: firstly, unlike the studies of Hasbulah et al. (2022) and Baqutayan and Mahdzir (2018) that focused only on the distributive dimension of Islamic finance, we adopt a more holistic approach that looks at both the distributive and the commercial dimension of Islamic finance with a particular focus on child health care. Secondly, we use panel data which allows for a more consistent analysis of the effects of Islamic finance on child health care since the longer period of study, from 1975 to 2021 permits us to take into account the different dynamics equally unlike the studies of Posso and Athukorala (2018), and DeLoach and Lamanna (2011) that adopted only a single indicator, we make use of four indicators of child health, namely overweight, infant mortality, the prevalence of anaemia, and the probability of dying. Lastly, our study is carried out at the macro level involving a continent-wide analysis in the context of Africa.

After controlling for endogeneity, results of the two-stage least square estimation show that Islamic finance ameliorates child health care in Africa. Specifically, there exist a negative and statistically significant effects of Islamic

<sup>1</sup> Shari'ah is a set of rules that Islam prescribes for humans to ensure their earthly well-being and their salvation in the hereafter (Islam and Ahmad, 2020)

finance on child overweight, infant mortality and the probability of dying at an early age among young children. While the effects of Islamic finance on the prevalence of anaemia among children are negative, they are not statistically significant.

The remainder of this paper is organized as follows. Section 2 presents the literature review. Section 3 discusses the methodology. Section 4 focuses on the results and discussion and section 5 draws conclusions and recommendations.

## 2. Literature Review: The Effects of Islamic Finance on Child Health Care

### 2.1 Theoretical literature review

Recent empirical studies examining the effects of the financial system on health care in general have made recourse to the Capability theory, particularly associated with (Sen, 2004; Sen, 2005; Sen, 1980), with the view that financial inclusion can garner peoples' freedom to make choices of essential needs such as improved water and sanitation, quality medical care as well as education, which would enhance their health (Immurana et al., 2021). Financial inclusion improves health by guiding specific economic opportunities and empowerment particularly among older populations (Allmark and Machaczek, 2015). In addition, financial capability provides opportunities for older people to take greater control of their finances, external environments, and be able to manage economic resources better and to adopt desired lifestyles and health outcomes (Allmark and Machaczek, 2015), including that of their children.

We therefore admit with the capability theory that the relationship between finance and child health care is fostered by empowering parents through giving them access to the necessary financial services such as access to credit. However, if this is the case in conventional finance, then it certainly will be for Islamic finance too, even more so because one of the two types of products it offers is especially dedicated to the redistribution of income, while the other types of products are based on the principle of profit and loss sharing, which reduces the burden on the borrower.

### 2.2 The effects of Islamic finance on child health care: A review of the empirical literature

Studies linking Islamic finance with health care have particularly focus on the social or the distributive dimension of Islamic finance especially zakat and waqf. For example in terms of zakat<sup>2</sup>, Hasbulah et al. (2022), through a library research method found that zakat distribution through MAIPk, an institution responsible for administering and managing all zakat matters in the state of Perak in Malaysia positively enhances the health status of the beneficiaries (*asnaf*). In terms of waqf<sup>3</sup>, (Baqtayan and Mahdzir, 2018) showed that waqf has been proven to provide an efficient alternative source of funding to the development of health care institutions. Thus whether it is waqf or zakat, the results have been convergent towards the idea that Islamic finance can serve as an important driver of health care, thereby confirming the results of the study of (Mohamed and Fauziyyah, 2020) according to which Islamic microfinance is one of the best tools to reduce poverty, especially in Muslim society and contradicting the results of the study by (Rokhman, 2013), which indicated that Islamic microfinance has no direct impact on health care. (Rokhman, 2013) advanced two reasons to justify his results. The first was the issuance of health insurance to the poor and the second reason concerned the tendency of the poor people to use alternative traditional medicine for medical treatment instead of going to hospital or doctor for medical treatment.

However, the role of Islamic finance in child health care can be modulated by a number of transmission channels. Three potential channels emerge from literature. The first channel is environmental protection. One of the principles of Islamic finance is the prohibition of activities that are linked to the destruction of the environment for example activities that create pollution or the over-exploitation of environmental resources as these activities are considered *haram* (forbidden) (Franzoni and Ait Allali, 2018; Nakhavali, 2017; Qoyum et al., 2022). However, recent empirical studies in the area of child health and the environment have concluded that child health can be negatively affected by environmental degradation (Balietti et al., 2022; Vrijheid et al., 2016; Zou et al., 2021). Thus, the protection of the environment is a channel through which Islamic finance can improve child health care. The second channel is women entrepreneurship. Islamic finance especially through women entrepreneurship can enhance women empowerment (Alaghbari et al., 2021; Islam, 2020; Zitouni and Jedidia, 2022). Meanwhile, other studies have testified that women empowerment is positively associated with child health (Essilfie et al., 2020) since it is believed that with greater power, women are in a better position to bargain for a greater share of household resources to be allocated toward expenditures that improve the health and well-being of children (DeLoach and Lamanna, 2011). Thus, empowering women through women entrepreneurship is a channel through which Islamic finance can improve child health care. The third channel is financial development. Islamic finance enables easy access to credit (Diomande, 2020; Ülev et al., 2022) given its products such as *qard hassan* and *mudarabah* that are tailored towards meeting the needs of the

<sup>2</sup> zakat is a tax at the rate of 2.5% paid by pious Muslims on all their personal property with the intention to reducing social inequalities.

<sup>3</sup> waqf involves the donation of a piece of land, the construction of a hospitals, the construction of schools for the benefits of the society.

most vulnerable members of the society. As shown by the literature, access to credit is an important contributor to health care in general and child health care in particular (Kruk et al., 2009).

The current study contributes to the above literature by looking at the role of Islamic finance in the amelioration of child health care in 27 African countries, from 1975 to 2021. The following sections provide the methodology, results, conclusion and recommendations.

### 3. Methodology

#### 3.1 Data

This study uses secondary data mobilized from different sources. For our dependent variable, child health, we make use of the data provided by the (World Bank, 2021)<sup>4</sup>. The same data source is used in addition to World Population Review (WPR, 2021) for our control variables. A detailed exposition of the different data sources is found in appendix 1. 27 countries are considered in this study and their choice is based on data availability.

#### 3.2 Measurement of variables

##### 3.3 Dependent variables

Empirical studies in child health performance have employed different indicators to better capture child health outcomes. Some studies have used only single indicators of child health such as child mortality (Posso and Athukorala, 2018), child height (DeLoach and Lamanna, 2011). To better capture child health, other studies have combined a package of indicators. For example height, weight, anaemia, food security and parents' reported indicators as indicators of child health (Moseson et al., 2014); infant mortality, low birth weight, stunting, underweight, wasting, overweight, and anaemia (Yaya et al., 2020). Based on the above studies we adopt multiple measures of child health comprising of overweight, infant mortality, prevalence of anaemia, and the probability of dying.

##### 3.4 Independent variables

Islamic finance is our variable of interest and is measured in this study with an indicator variable inspired from the work of (Ngono, 2021).

$$\text{Islamic finance} = \begin{cases} 1 & \text{for presence of Islamic finance} \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

In order to construct this variable, we first of all identify the year of creation of the first Islamic finance institution in each country in our sample. For each of these countries, a dummy variable is created taking the value 0 for the years before the introduction of Islamic finance and 1 for the years after its introduction. It is important to note that loans from the Islamic development bank are not considered as the beginning of Islamic finance in these countries. We consider 27 African countries that practice Islamic finance as shown in appendix 2. Our study period is from 1975 to 2021. Our analyses start from 1975 so as to include Sudan which introduced Islamic finance in 1977. A two years backward shift is necessary so as to have a before and an after dynamic assessment. 2021 is the last year due to the availability of data for some indicators. Egypt is considered as the first country to formally introduced Islamic finance (in 1963) but it is included in our analysis due to the fact that the banks created in 1963 were merged with government banks in 1967 for political reasons. So Islamic finance in Egypt was formally reintroduced in 1979 following the establishment of Faisal Bank of Egypt (Daoud and Kammoun, 2020).

Our control variables are defined as follows: (i) Financial development measured by the total amount of credit to the private sector; (ii) Urbanization which is the percentage of urban population to total population (Salahuddin et al., 2020); (iii) logGDP per capital (Anyanwu, 2016), which measures the level of economic growth; (iv) female labour which captures women labour participation (Posso and Athukorala, 2018); (v) CO2 emission which measures the level of environmental protection (Akeju and Olanipekun, 2020); (vi) Internet (Salahuddin et al., 2020) which is used as a proxy for ICT; (vii) political stability (Ondere and Garfield, 2015) which measures perceptions of the likelihood of political instability and/or politically-motivated violence tension; (viii) Access to electricity which captures the percentage of the population using electricity (Irwin et al., 2020). The conceptual model is given as:

$$\text{child health}_{it} = f(\text{islamic finance}_{it}, \text{financial development}_{it}, \text{urbanization}_{it}, \text{logGDP}_{it}, \text{female labour}_{it}, \text{CO2}_{it}, \text{internet}_{it}, \text{political stability}_{it}, \text{electricity}_{it}) \quad (2)$$

<sup>4</sup> Specifically, we employ the data from the Health, Nutrition and Population statistics (2021) and the Environment, Social and Governance (2021)

3.3 Econometric model

In order to empirically examine the effects of Islamic finance on child health care in Africa, we make use of the model below which is an empirical extension of Ajefu et al. (2020) who highlighted the impact of financial inclusion on mental health

$$CH_{it} = \alpha + \beta IF_{it} + \lambda_1 FD_{it} + \lambda_2 URB_{it} + \lambda_3 \log GDP_{it} + \lambda_4 FL_{it} + \lambda_5 CO2_{it} + \lambda_6 IN_{it} + \lambda_7 POL_{it} + \lambda_8 ELEC_{it} + v_i + u_t + \varepsilon_{i,t} \tag{3}$$

Where  $CH_{it}$  represents child health variables (overweight, mortality, prevalence of anaemia, and probability of dying) in country  $i$  at period  $t$ ,  $IF$  - Islamic finance,  $FD$  - financial development,  $URB$  - urbanization,  $\log GDP$  - logGDP per capita,  $FL$  - female labour,  $CO2$  - CO2 emission,  $IN$  - internet,  $POL$  - political stability,  $ELEC$  - access to electricity.  $\alpha, \beta, \lambda$ , are the equation parameters while  $v_i + u_t + \varepsilon_{i,t}$  are respectively temporal fixed effects, countries fixed effects and disturbance.

3.4 Estimation technique

The econometric model is first estimated using the ordinary least square approach (OLS). The OLS-based econometric technique is generally used as an initial framework in analysis to give the overall trend of results (Ongo Nkoa et al., 2022). However, there is a potential problem of endogeneity: (i) between Islamic finance and child health care variables. This reverse causality is explained by the fact that Islamic finance can lead to better health care of children as justified in the empirical literature review above. But it is equally worth noting that a household whose children are healthy can save more money and is consequently more likely to request Islamic finance products. (ii) There is the risk of a measurement error linked to the Islamic finance variable (Ngono, 2021). (iii) There is equally the possibility that Islamic finance moderates the relationships between GDP per capita (Imam and Kpodar, 2016) and child health on one hand and financial development and child health care on the other hand, given it principles permit even the most vulnerable members of the society to access financial services such as credit (Iqbal and Mirakhor, 2017). The performance of the Durbin Wu Hausman endogeneity test as shown in table 3 supports these facts. From this test, we reject the null hypothesis of the absence of endogeneity in favour of the alternative hypothesis. To address this problem, the related literature proposes the use of a two stage least square technique. Appendix 5 shows the Underidentification and the Overidentification tests of all instruments. The results show that all the instruments selected passed the tests.

4. Results

4.1 Descriptive analysis

The descriptive analyses below permit us to compare some macroeconomic variables between the periods without Islamic finance and the periods with Islamic finance. It follows that there has been an improvement in child health care between these two periods. Children overweight, mortality, anaemia prevalence and probability of dying have all recorded a decline of -0.059, -0.171, -0.270, -0.039 respectively during the periods with Islamic finance. As far as urbanization is concerned, it is the period with Islamic finance that registers the highest number of urban population that is 48.5%. The volume of credit offered to the private sector; financial development has almost doubled between the two periods with the period with Islamic finance registering 32.769 as opposed to 17.421 in the periods before Islamic finance was introduced. Economic growth measured using the log of GDP per capita is equally known to have witnessed an increase to 8.908 during the period with Islamic finance as opposed to 8.613 during the period before. Concerning female labour participation, it is rather the period without Islamic finance that recorded the higher rate, but this difference is not significant. While political stability and CO2 emission seem to have worsened during the periods with Islamic finance, it is the periods with Islamic finance that recorded an explosion in the rate of internet penetration in Africa, 13.148% as opposed to 1.519%. Lastly, during the periods with Islamic finance, more people have had access to electricity, 52.697% of the total population as opposed to the period without Islamic finance, 38.197% of the total population.

Table 1: A comparative analysis between the presence and the absence of Islamic finance

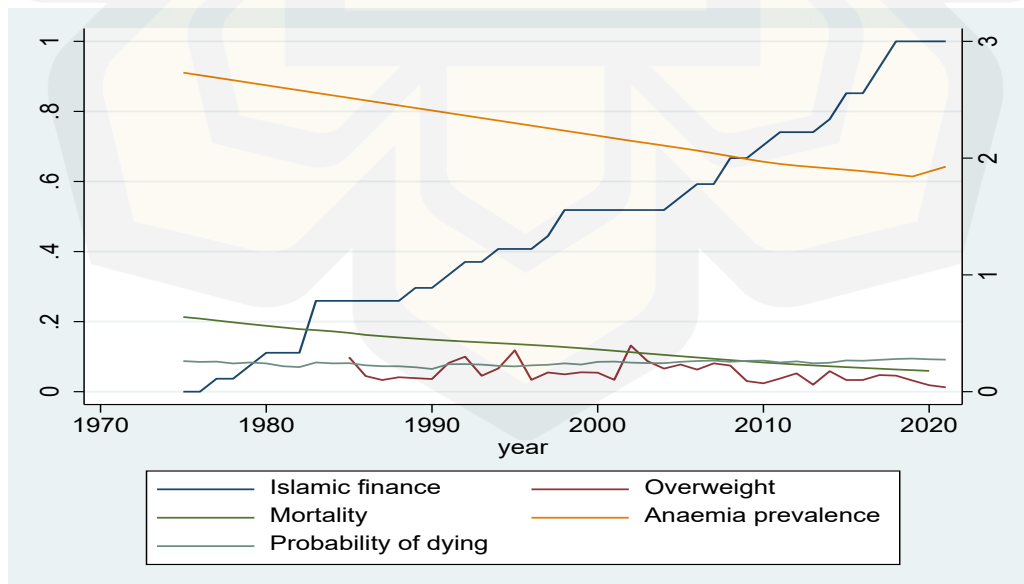
Variable	Before Islamic finance (1)	After Islamic finance (2)	Difference t-test (3) = (2) – (1)	Prob Significance
Child overweight	0.194 (.147)	0.135 (.158)	-0.059	0.0052**
Mortality rate	0.462 (.19)	0.292 (.183)	- 0.171	0.000***
Anemia prevalence	2.194 (.633)	1.917 (.597)	- 0.270	0.000***

Probability of dying	.267 (.165)	.228 (.19)	-0.039	0.0014**
Financial Development	17.421 (25.336)	32.769 (36.506)	15.348	0.0000***
Urbanization	.381 (.248)	.485 (.22)	0.103	0.0000***
logGDP per capita	8.613 (.544)	8.908 (.485)	0.295	0.0000***
Female Labor	47.926 (20.087)	47.586 (22.73)	-0.340	0.6113
CO2 emission	.865 (1.992)	1.4 (2.069)	0.536	0.0001***
Internet	1.519 (6.415)	13.148 (18.229)	12.473	0.0000***
Political Stability	-.481 (.71)	-.898 (.93)	-0.417	1.0000
Access to electricity	38.197 (28.31)	52.697 (31.284)	14.500	0.0000***

Source: Authors

Figure 1 provides a visual description of child health care indicators and Islamic finance. Over the past few decades, Africa has made significant strides in health care in general and under-five healthcare in particular. For example, according to UNICEF (2020) under-five child mortality rates in Africa are reducing at an average annual rate of 3.7 per cent. Despite this real progress, challenges still remain as there are significant disparities both within and between countries, and also the fact that the region accounts for a quarter of all maternal deaths worldwide (UNICEF, 2022). Among the major health challenges on the continent, the prevalence of anaemia in children below the age of five constitutes one of the areas that have recorded the modest level of improvement. In sub Saharan Africa, Weze et al. (2021) found that anemia affects around 60% of children. The improvements recorded in child health care came at a time when most African countries started to embrace Islamic mode of finance, which has gradually become part and parcel of the financial system of most countries on the continent. For example in terms of sukuk, the continent accounted for just over 500million US dollars in 2018 (Moody's, 2018), accounting for just about 0.5% of the global sukuk assets value but in 2021, this value rose to over 155billion US dollars even though it is only about 1.55% of the global sukuk assets value<sup>5</sup>.

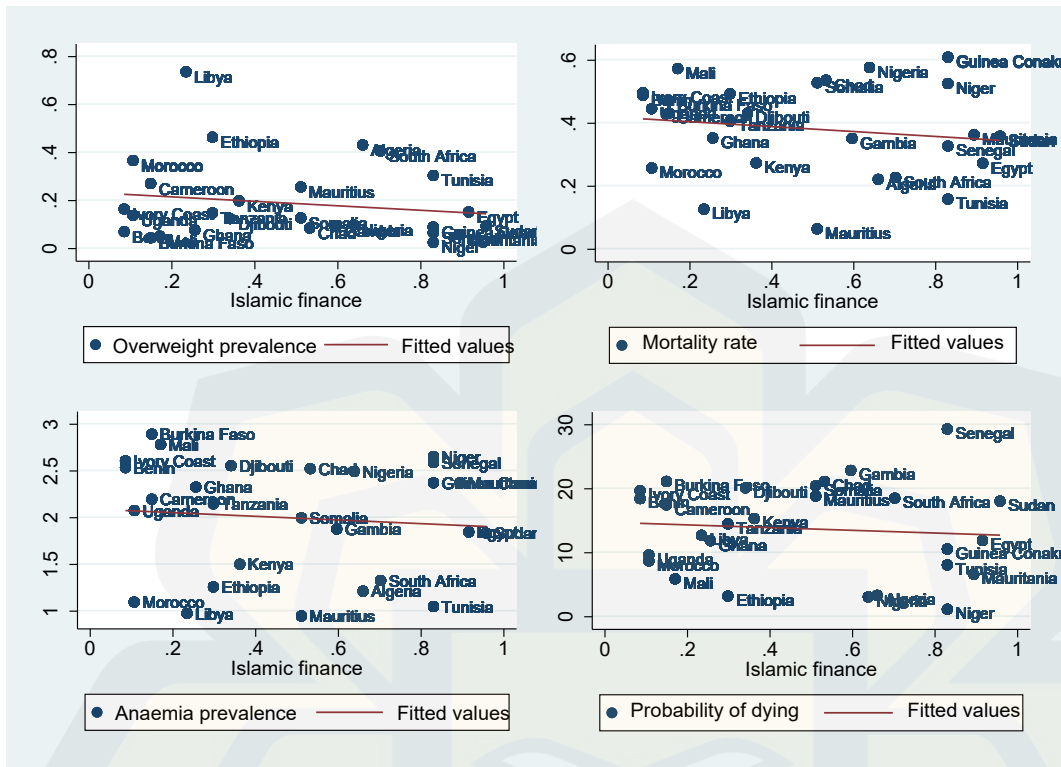
Figure 1: Evolutions of Islamic finance sand child health care in Africa from 1975-2021



Source: Authors' own based on WDI (2021) and the year of the introduction of Islamic finance in different African countries

<sup>5</sup> <https://african.business/2021/05/finance-services/how-can-africa-tap-its-huge-potential-for-islamic-banking/>

Figure 2: Correlation between Islamic finance and child health care in Africa



Source: Authors based on WDI (2021) and the year of the introduction of Islamic finance in different African countries

The two-way fitted plots in Figure 2 show that Islamic finance has negative effects on four indicators of child health – that is overweight, mortality rate, prevalence of anaemia and probability of dying, though with different levels of significance. This relationship can however be influenced by several other control variables in a modelling framework. There is therefore the need to verify this relationship through an empirical approach.

#### 4.2 Baseline results

The results displayed in Table 2 below are obtained using the ordinary least square technique and indicate that our variable of interest, Islamic finance negatively and significantly affects child overweight, mortality rate and probability of dying. The effects of Islamic finance on the prevalence of anaemia while negative, are not statistically significant. However, this estimation technique despite being robust in some cases, might rather tend to produce inconsistent results in our case given its inability to address the problem linked to endogeneity as already justified at the level of our methodology and by the endogeneity test presented in table 2 below. The performance of the Durbin Wu Hausman endogeneity test as shown in Table 2 permits us to reject the null hypothesis on the absence of endogeneity in favor of the alternative hypothesis. To address this problem, the related literature proposes the use of a two stage least square technique.

Table 2: The effects of Islamic finance on child health care in Africa (estimation technique: OLS)

Variables	(1) Overweight	(2) Mortality	(3) Anaemia prevalence	(4) Probability of dying
Islamic Finance	-0.0451** (0.0181)	-0.0384*** (0.00836)	-0.0265 (0.0350)	-0.121*** (0.0220)
Financial development	0.00115*** (0.000383)	0.000624*** (0.000118)	-0.00451*** (0.000481)	0.000228 (0.000278)

urbannor	-0.0174 (0.0615)	0.161*** (0.0247)	0.508*** (0.103)	-0.0879 (0.0835)
logGDP per capita	0.342*** (0.0393)	-0.0703*** (0.0155)	-0.884*** (0.0637)	-0.184*** (0.0455)
Female Labour	0.00393*** (0.000829)	0.000413 (0.000433)	-0.00304* (0.00180)	-0.00790*** (0.00110)
CO2 emissions	0.00855 (0.00856)	-0.00844*** (0.00314)	0.0271** (0.0130)	0.0341*** (0.00900)
Internet	-0.00341*** (0.000750)	-0.00178*** (0.000311)	0.00204 (0.00128)	0.00293*** (0.000852)
Political Stability	-0.0222** (0.0104)	-0.0301*** (0.00439)	0.0602*** (0.0183)	0.0205* (0.0109)
Access to electricity	0.00151*** (0.000561)	-0.00280*** (0.000223)	-0.00768*** (0.000931)	-0.00284*** (0.000634)
Constant	-3.161*** (0.347)	0.946*** (0.135)	10.38*** (0.558)	2.599*** (0.402)
Observations	156	553	513	324
R-squared	0.711	0.706	0.730	0.280
Endogeneity test	0.100	0.015	0.761	0.088

Standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1  
Source: Authors

The results presented in table 3 below are those of the two stage least square estimation technique after taking into account the problem of endogeneity. These results are very much in line with our baseline results obtained in Table 2 using the OLS technique, with the only difference being the levels of significance. The results reveal that Islamic finance ameliorates child health care in Africa. Specifically, there exist a negative and statistically significant effects of Islamic finance on child overweight (at 1% level of significance), infant mortality (at 1% level of significance) and probability of dying (at 1% level of significance). While the effects of Islamic finance on the prevalence of anaemia among children are negative, they are not statistically significant. These results further confirm those obtained by previous studies on the importance of the financial system in health care in general and child health care in particular (DeLoach and Lamanna, 2011; Moseson et al., 2014; Posso and Athukorala, 2018). The negative effects of Islamic finance on these child health outcomes can possibly be explained by a number of reasons including: first Islamic finance can offer health-related services, such as health education, health-care financing, clinical care, training community health workers, health micro-insurance and the construction of hospitals especially through the waqf product; secondly, Islamic finance as an important driver of financial inclusion, taking care of those considered as “unbankable” by the conventional system can help in the development of entrepreneurial activities especially females entrepreneurship hence enabling women to engage in income generating activities (Andriamahery and Qamruzzaman, 2021; Khanum et al., 2020). This in turn helps women take care of the needs of their children including their health care since it is believed that women are more likely to spend additional income on children’s well-being (Posso and Athukorala, 2018).

Table 3: The effects of Islamic finance on child health care in Africa (estimation technique: 2SLS)

Variables	(1) Overweight	(2) Mortality	(3) Anaemia prevalence	(4) Probability of dying
Islamic Finance	-0.0692*** (0.0205)	-0.0317*** (0.00980)	-0.0189 (0.0443)	-0.157*** (0.0262)
Financial Development	0.000938 (0.000694)	0.000650*** (8.64e-05)	-0.00448*** (0.000358)	0.000208 (0.000233)
Urbanization	-0.0188	0.165***	0.512***	-0.117



	(0.0822)	(0.0200)	(0.0982)	(0.0864)
logGDP per capita	0.333***	-0.0698***	-0.883***	-0.196***
	(0.0608)	(0.0102)	(0.0519)	(0.0401)
Female Labour	0.00364***	0.000518	-0.00292*	-0.00836***
	(0.000776)	(0.000356)	(0.00150)	(0.00128)
CO2 emissions	0.0114	-0.00865***	0.0268***	0.0370***
	(0.0190)	(0.00252)	(0.0101)	(0.00841)
Internet	-0.00300***	-0.00184***	0.00196	0.00338***
	(0.000932)	(0.000218)	(0.00105)	(0.000778)
Political Stability	-0.0245*	-0.0295***	0.0608***	0.0173*
	(0.0148)	(0.00430)	(0.0189)	(0.0103)
Access to electricity	0.00144*	-0.00281***	-0.00769***	-0.00280***
	(0.000830)	(0.000153)	(0.000650)	(0.000552)
Constant	-3.043***	0.930***	10.36***	2.763***
	(0.546)	(0.0918)	(0.463)	(0.359)
Observations	156	553	513	324
R-squared	0.707	0.705	0.730	0.274
Uncentered R-squared	0.842	0.931	0.976	0.773
Number of countries	27	27	27	27

Robust standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1  
Source: Authors

While financial development proxied by the total amount of credit to the private sector has a negative effect on the prevalence of anaemia in children, it tends to increase under five mortality. These results are contrary to those obtained by [Chireshe and Ocran \(2020\)](#) on the effects of financial development on health outcomes in sub Saharan Africa.

Urbanization tends to worsen child health care in Africa, particularly child mortality and anaemia prevalence among children. This can be justified by the inadequate medical facilities in big cities in most African countries that fail to cope with the increasing urban population. This is partly in line with the results of the study carried out by [Ameje and De Weerd \(2020\)](#) who concluded that child health care tends to deteriorate at the highest levels of urbanization.

Economic growth plays an important role in the amelioration of children health outcomes. Our results show that logGDP per capita negatively and significantly affects three measures of child health outcomes, mortality, the prevalence of anaemia and the probability of dying. These results are in line with those obtained by [Salahuddin et al. \(2020\)](#). The positive effect on child overweight can be explained by the perception that most families accord to child overweight.

Female labour participation while negatively and significantly affecting the prevalence of anaemia among children and the probability of dying, has a positive and significant effect on child overweight. The role of female labour participation on child health care has been accounted for by the literature by the fact that a well to do woman can guarantee the needs of her household since women are more likely to spend additional income on children's well-being ([Posso and Athukorala, 2018](#)). However, the positive effect of female labour participation on child overweight can be explained by the perception most families accord to child overweight. Studies have shown that some families interpret overweight as a sign of good health ([O'Brien et al., 2022](#)). This permits a well to do mother to obviously play a role in enhancing overweight in children. The same justification can be advanced for the rest of the control variables vis-à-vis their effects on child overweight.

The effects of CO2 emissions on child health care are mixed. While the effects on child mortality are negative, there exist positive effects on the other measures of child health outcomes. The former effect can be explained by the fact that the activities producing this pollution are able to generate enough resources which are used to produce health related services such as immunization and the construction of modern facilities. The latter effects are in line with the results of previous studies (see, for examples; [Brugha and Grigg, 2014](#); [Perera, 2017](#)).

Internet access reduces child overweight and mortality rate while at the same time increases the probability of dying among children. [Obasola et al. \(2015\)](#) have already shown that ICT can positively affect health care. Contrary to the study of [Obasola et al. \(2015\)](#), [Panova and Lleras \(2016\)](#) showed that long term utilization of ICTs can inversely affect mental health. Similarly, political stability also has mixed effects on child health in Africa. While the effects are negative for overweight and mortality, it rather tends to have a positive influence on anaemia prevalence and the probability of dying. Lastly, access to electricity has negative and significant effects on child mortality, anaemia

prevalence and probability of dying. This is in line with the results of the study by [Irwin et al. \(2020\)](#), who conceptualized the effect of access to electricity on health in low- and middle-income countries.

#### *4.3 Robustness analysis*

#### *4.4 Robustness check: Taking into account disparities in religious practice (2SLS)*

The first part of our robustness analysis involves dividing the countries in our sample into two groups: - Muslim dominated and non-Muslim dominated as shown in appendix 3. This division is done based on data provided by the World Population review ([WPR, 2021](#)). A country is said to be Muslim dominated if over 50% percent of its population practices Islam and vice versa. The table below provides the combined results of the two groups of countries.



Muslim dominated countries					Non- Muslim dominated countries			
	1	2	3	4	1	2	3	4
Variables	Overweight	Mortality	Anaemia prevalence	Probability of dying	Overweight	Mortality	Anaemia prevalence	Probability of dying
Islamic Finance	0.0126 (-0.0295)	-0.0421*** (-0.012)	-0.113* (-0.0585)	-0.190*** (-0.0402)	-0.109*** (-0.0346)	-0.0531*** (-0.0174)	-0.235*** (-0.048)	-0.0823 (-0.0542)
Financial development	0.00199*** (-0.000591)	0.000763*** (-0.000111)	-0.00447*** (-0.000611)	-0.000634** (-0.000323)	0.00233 (-0.00243)	-0.00351*** (-0.00102)	-0.0183*** (-0.00279)	0.0114** (-0.0045)
Urbanization	0.0739 (-0.0586)	0.100*** (-0.0232)	0.146 (-0.133)	-0.278*** (-0.0857)	-0.348* (-0.181)	0.383*** (-0.0715)	1.456*** (-0.172)	0.688** (-0.316)
logGDP per capita	0.160** (-0.0635)	-0.0216 (-0.0193)	-0.443*** (-0.11)	-0.0534 (-0.0529)	0.230** (-0.102)	0.237*** (-0.0284)	0.183* (-0.11)	-0.646*** (-0.149)
Female Labour	0.00276*** (-0.000983)	0.00140*** (-0.000467)	0.00574** (-0.00255)	-0.0193*** (-0.00153)	0.00776*** (-0.00168)	-0.00334*** (-0.000768)	-0.0152*** (-0.00194)	-0.002 (-0.00205)
CO2 emissions	0.0703*** (-0.0136)	-0.0165*** (-0.00364)	-0.0590*** (-0.0166)	0.0181* (-0.00982)	-0.0133 (-0.036)	0.0187 (-0.0138)	0.116*** (-0.0369)	-0.0847 (-0.0575)
Internet	-0.00257*** (-0.000921)	-0.00205*** (-0.00027)	-0.00164 (-0.00129)	0.00353*** (-0.00106)	-0.000635 (-0.00142)	-0.00404*** (-0.000474)	-0.0024 (-0.00163)	-0.00145 (-0.00131)
Political stability	-0.00104 (-0.0122)	-0.0212*** (-0.00425)	0.0351 (-0.0229)	0.00375 (-0.012)	-0.0364 (-0.0225)	-0.0451*** (-0.00717)	0.0311** (-0.0153)	-0.00497 (-0.0164)
Access to electricity	0.000362 (-0.000807)	-0.00303*** (-0.000155)	-0.00685*** (-0.000812)	-0.00631*** (-0.000534)	0.00458*** (-0.00138)	-0.00364*** (-0.000451)	-0.00955*** (-0.00117)	-0.000834 (-0.00144)
Constant	-1.587*** (-0.587)	0.510*** (-0.175)	6.283*** (-0.991)	2.419*** (-0.495)	-2.448*** (-0.864)	-1.471*** (-0.239)	1.804* (-0.961)	5.697*** (-1.272)
Observations	98	324	304	180	58	229	209	144
R-squared	0.837	0.86	0.808	0.544	0.686	0.745	0.899	0.489
Uncentered R-squared	0.894	0.964	0.982	0.843	0.896	0.949	0.992	0.865
Number of countries	16	16	16	16	11	11	11	11

Table 4: The effects of Islamic finance on child healthcare in Africa taking into account disparities in religious practice (2SLS)  
Robust standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1  
Source: Authors

The robustness analyses in table 4 are very much in line with our main results except for a change in the level of significance of the variable Islamic finance. However, it can equally be seen that the effects of Islamic finance on child health care are more pronounced in non-Muslim dominated than Muslim dominated countries. This is so despite the fact that Muslim dominated countries are considered the pioneers of this mode of finance. A possible justification of this result is that in Muslim dominated countries, women labour participation is still not given the same level of importance as is the case in non-Muslim dominated countries (Njoh and Akiwumi, 2012). This however reduces the indirect effects of Islamic finance on child health care in these countries.

#### *4.5 Robustness check: Taking into account disparities in income level (2SLS)*

The second robustness analysis of this study is done using the (World Bank, 2021) classification of countries into different income groups. The countries in our sample are divided into two groups, low income and middle income groups as indicated in Appendix 4

After taking into account income level, the results in table 5 below reveal that: as compared to the main results of this study, there is a drop in the level of significance on the effects of Islamic finance on child health outcomes. Specifically in low-income countries, Islamic finance negatively and significantly affects the probability of dying among children in Africa. The effects on the other indicators though negative are insignificant. On the other hand, in middle income countries, the results reveal that Islamic finance negatively and significantly affects overweight, mortality and probability of dying.

Thus, the effects of Islamic finance on child health can vary depending on whether one is talking about middle or low income countries. The fact that these effects are more pronounced in middle income countries can be justified by a number of points: health expenditure in low income countries is low and consequently there exist a high cost of health care services which limits the possible effects of Islamic finance; equally, low level of parental education in these countries especially female education makes parents to accord less importance to child health; there is equally the presence of social norms that reduce women empowerment and consequently child health. Lastly, traditionally, the majority poor do not go to hospital or doctor for medical treatment; they rather use alternative traditional medicine (Rokhman, 2013). All these issues tend to weaken the channels through which Islamic finance can affect child health. These factors, though present in middle-income countries, are considered less severe as compared to low income countries.

Variables	Middle income countries				Low income countries			
	1	2	3	4	1	2	3	4
	Overweight	Mortality	Anaemia prevalence	Probability of dying	Overweight	Mortality	Anaemia prevalence	Probability of dying
Islamic finance	-0.111*** (-0.0332)	-0.0386*** (-0.0114)	0.121** (-0.0501)	-0.0727** (-0.035)	-0.00501 (-0.0225)	-0.0116 (-0.0191)	0.0962 (-0.0626)	-0.213*** (-0.061)
Financial development	7.59E-05 (-0.00096)	0.000756*** (-0.00016)	-0.00439*** (-0.000752)	0.00166*** (-0.000482)	0.000506 (-0.000586)	0.00108*** (-0.000249)	0.0013 (-0.00119)	0.00202** (-0.00102)
Urbanization	-0.101 (-0.103)	0.183*** (-0.0244)	0.784*** (-0.108)	0.174 (-0.126)	0.208*** (-0.0758)	0.261*** (-0.0704)	0.0749 (-0.253)	-0.443*** (-0.117)
logGDP per capita	0.334*** (-0.0885)	-0.0886*** (-0.0184)	-1.029*** (-0.0854)	-0.190*** (-0.0507)	0.507*** (-0.0797)	-0.00586 (-0.0291)	-1.472*** (-0.14)	-0.263*** (-0.0577)
Labour participation	0.00376*** (-0.000916)	-8.67E-05 (-0.000402)	-0.00738*** (-0.00148)	-0.00504*** (-0.00142)	-0.00214 (-0.00179)	-4.65E-05 (-0.00104)	0.0278*** (-0.00524)	-0.0118*** (-0.0028)
CO2 emissions	0.0185 (-0.0244)	-0.00943*** (-0.00335)	0.0268* (-0.014)	0.0211** (-0.0103)	-0.820*** (-0.161)	-0.118 (-0.0982)	2.464*** (-0.41)	1.212*** (-0.334)
Internet	-0.00201* (-0.00113)	-0.00198*** (-0.000257)	0.00146 (-0.00136)	0.000855 (-0.000803)	-0.00308** (-0.00149)	-0.000957 (-0.00101)	0.00662* (-0.00359)	0.00292* (-0.00168)
Political stability	-0.027 (-0.0207)	-0.0360*** (-0.00736)	0.0980*** (-0.0264)	0.0247* (-0.0131)	-0.0067 (-0.0134)	-0.0138 (-0.00875)	-0.0242 (-0.0391)	0.0340* (-0.0183)
Access to electricity	0.00195** (-0.000956)	-0.00265*** (-0.000166)	-0.00901*** (-0.000695)	-0.00451*** (-0.00085)	-0.000223 (-0.000743)	-0.00633*** (-0.000788)	-0.0118*** (-0.00317)	-0.00614*** (-0.00176)
Constant	-3.022*** (-0.776)	1.122*** (-0.165)	11.84*** (-0.728)	2.428*** (-0.455)	-4.062*** (-0.663)	0.448* (-0.248)	12.98*** (-1.165)	3.526*** (-0.644)
Observations	86	351	323	207	70	202	190	117
R-squared	0.724	0.7	0.793	0.379	0.761	0.611	0.683	0.608
Uncentered R2	0.874	0.91	0.978	0.822	0.856	0.962	0.984	0.862
Number of countries	17	17	17	17	10	10	10	10

Table 5: The effects of Islamic finance on child healthcare in Africa taking into account disparities in income level (2SLS)  
Robust standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0  
Source: Authors

## **5. Conclusion and Recommendations**

This study examined the effects of Islamic finance on child health care in 27 African countries over the period 1975 to 2021. The data on different variables were gathered from the World Bank data and the World Population Review statistics. After controlling for potential endogeneity, our 2SLS results reveal that Islamic finance ameliorates child health care in Africa. Specifically, we found evidence of a negative and statistically significant effects of Islamic finance on child overweight (at 1% level of significance), infant mortality (at 1% level of significance) and probability of dying at an early age among young children (at 1% level of significance). While the effects of Islamic finance on the prevalence of anaemia among children are negative, they are not statistically significant. Our robustness analysis takes into account differences in religion and income level of the countries in our sample. The first results of this analysis reveal that the effects of Islamic finance on child health care are more pronounced in non-Muslim dominated than Muslim dominated countries. The second results of our robustness analysis indicate that the effects of Islamic finance on child health care are more pronounced in middle income countries than in low income countries. The findings of this study are consistent with the empirical literature and support the view that African countries can turn to Islamic finance for the promotion of child health care in particular and health care in general vis-à-vis the attainment of the 2030 United Nations SDGs.

From a policy perspective, the following measures could be adopted to increase child health care in Africa. Policymakers should put in place the necessary mechanisms for the promotion of Islamic finance such as the enacting laws that ensures the creation of full-fledged Islamic banks. Secondly more people especially women should be encouraged to patronize Islamic finance by creating awareness on the benefits and the specificities of Islamic mode of financing, laying emphasis on the sharia-compliant of Islamic finance institutions etc. Lastly based on our findings, there is the need for policymakers to adopt some accompanying measures such as reducing the cost of health care, encouraging female education amongst others. To the researchers, there is the need to adopt a more concrete measure of Islamic finance such as the total Islamic finance assets value as a percentage of total financial assets, total value of sukuk, etc even though this information is not currently available for many countries on the continent.



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#### Appendix 1: Data sources

Variables	Indicators	Data sources
Overweight	Percentage of children under age 5 whose weight for height is more than two standard deviations above the median for the international reference population of the corresponding age.	WDI (2021)
Mortality	the number of infants dying before reaching one year of age, per 1,000 live births in a given year.	Health Nutrition and Population statistics (2021)
Anaemia prevalence	Percentage of children ages 6-59 months whose hemoglobin level is less than 110 grams per liter, adjusted for altitude.	Health Nutrition and Population statistics (2021)
Probability of dying	Probability of dying between ages 5-9 years of age expressed per 1,000 children aged 5, if subject to age-specific mortality rates of the specified year.	Health Nutrition and Population statistics (2021)
Islamic finance	Binary variable (0 1)	Computed by authors
Financial development	Total amount of credit to the private sector	WDI (2021)
Urbanization	Percentage of population living in urban areas	WDI (2021)
Economic growth	LogGDP per capita	WDI (2021)
Female labour	Rate of female labour participation	WDI (2021)
CO2 emission	Those stemming from the burning of fossil fuels and the manufacture of cement.	Environment Social and Governance Indicators (2021)
Political stability	Perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.	WDI (2021)
Access to electricity	Percentage of population with access to electricity	Environment Social and Governance Indicators (2021)

Source: Authors

#### Appendix 2: Islamic finance in Africa

Countries	Year of introduction	Muslim % of total population
Sudan	1977	97
Egypt	1979	92.35
Mauritania	1980	100
Niger	1983	98.3
Guinea Conakry	1983	89.1
Senegal	1983	96.1
Tunisia	1983	99.8
South Africa	1989	1.9
Algeria	1991	99
Nigeria	1992	49.60
Gambia	1994	95.7

Chad	1997	58
Somalia	1998	99.8
Mauritius	1998	17.3
Kenya	2005	11.2
Djibouti	2006	97
Tanzania	2008	35.2
Ethiopia	2008	33.9
Ghana	2010	18
Libya	2011	97
Mali	2014	95
Cameroon	2015	30
Burkina Faso	2015	61.5
Uganda	2017	14
Morocco	2017	99
Ivory Coast	2018	42.5
Benin	2018	27.7

Source: Authors' compilation based on ([Ngono 2021](#); [Daoud and Kammoun, 2020](#); [WPR, 2021](#))

#### Appendix 3: List of countries by religion

**Non-Muslim dominated**  
 South Africa, Tanzania, Ghana, Benin, Kenya, Mauritius,  
 Cameroon, Ivory Coast, Ethiopia, Uganda, Nigeria

**Muslim dominated**  
 Algeria, Libya, Senegal, Mauritania, Djibouti, Morocco,  
 Tunisia, Egypt, Sudan, Mali, Guinea, Chad, Burkina Faso,  
 Somalia, Gambia, Niger

#### Appendix 4: List of countries by income level

**Middle income countries**  
 Algeria, Libya, Nigeria, Senegal, South Africa,  
 Tanzania, Mauritania, Ghana, Benin, Djibouti, Kenya,  
 Mauritius, Morocco, Tunisia, Cameroon, Ivory Coast,  
 Egypt

**Low income countries**  
 Gambia, Sudan, Uganda, Somalia, Niger,  
 Guinea, Chad, Burkina Faso, Ethiopia, Mali

Source: Authors' based on ([WDI, 2021](#))

Overidentification tests of all instruments  
Dependent variable: Overweight

Underidentification test of all instruments (Kleibergen-Paap rk LM statistic)	Chi-sq(2) P-val = 0.0000
Overidentification test of all instruments (Hansen J statistic)	Chi-sq(1) P-val = 0.3222
Weak identification test (Cragg-Donald Wald F statistic): (Kleibergen-Paap rk Wald F statistic):	79.844 46.630
Stock-Yogo weak ID test critical values:	
10% maximal IV size	13.43
15% maximal IV size	8.18
20% maximal IV size	6.40
25% maximal IV size	5.45

Dependent variable: Probability of dying

Underidentification test of all instruments (Kleibergen-Paap rk LM statistic)	Chi-sq(2) P-val = 0.0000
Overidentification test of all instruments (Hansen J statistic)	Chi-sq(1) P-val = 0.1436
Weak identification test (Cragg-Donald Wald F statistic): (Kleibergen-Paap rk Wald F statistic):	234.236 107.102
Stock-Yogo weak ID test critical values:	
10% maximal IV size	13.43
15% maximal IV size	8.18
20% maximal IV size	6.40
25% maximal IV size	5.45

Dependent variable: Anemia prevalence

Underidentification test of all instruments (Kleibergen-Paap rk LM statistic)	Chi-sq(2) P-val = 0.0000
Overidentification test of all instruments (Hansen J statistic)	Chi-sq(1) P-val = 0.5604
Weak identification test (Cragg-Donald Wald F statistic): (Kleibergen-Paap rk Wald F statistic):	499.334 255.534
Stock-Yogo weak ID test critical values:	
10% maximal IV size	13.43
15% maximal IV size	8.18
20% maximal IV size	6.40
25% maximal IV size	5.45

Dependent variable: Mortality

Underidentification test of all instruments (Kleibergen-Paap rk LM statistic)	Chi-sq(2) P-val = 0.0000
Overidentification test of all instruments (Hansen J statistic)	Chi-sq(1) P-val = 0.2533
Weak identification test (Cragg-Donald Wald F statistic): (Kleibergen-Paap rk Wald F statistic):	538.864 286.110
Stock-Yogo weak ID test critical values:	
10% maximal IV size	13.43
15% maximal IV size	8.18
20% maximal IV size	6.40
25% maximal IV size	5.45