Health aid and child mortality in Africa: Evidence from disaggregated analysis

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Abstract

Background: The international development community has been instrumental in eliniminating child deaths via its major intervention programmes, especially as it relates to bridging the finance gap of developing countries. The paper assesses the effect of health aid and its sub-categories on child mortality.

Method: This was achieved by employing the System Generalized Method of Moment (SGMM) dynamic panel data estimator approach.

Findings: The study found that health targeted aid was capable of reducing child death but its effectiveness declined by about 40 percent and 80 percent when controlled for institutional quality and socio-political instability respectively. Among the sub-categories, child health outcome was more responsive to aid targeting child health, newborn health, maternal health and malaria control.

Conclusion: The evidence obtained would be useful in channeling resources towards the achievement of Sustainable Development Goal (SDG) 3, which entails ending preventable deaths of children under 5 years of age.

Keywords: Health aid, child mortality, panel data, SDG, Africa

JEL Classification: F35 I12 C23 Q01 N37

Introduction

A number of health intervention programmes succeeded in developing countries following assistance rendered in form of development loans, grants, drugs and expert advice by the international community and donors (Levine *et al.,* 2004). This has generally improved health indicators in developing countries over the last few decades, resulting in significant decline in infant mortality (WHO, 2013). The goal of donor fund health-targeted aid is to improve health outcomes in recipient countries via budget assistance for government ministries, providing up-to-date medical equipments and training medical workers; hence yielding better health quality and accessible to healthcare services. Gebhard, Kitterman, Mitchell, Nielson and Wilson (2008) indicated that health aid projects guarantee more access to better medical care, thus extending life expectancy and declining mortality rates. In the same wise, concerted global efforts in advancing immunization coverage, preventive programmes such as neonatal care, nutritional programmes, and disease control strategies has reduced susceptibility to diseases, thereby resulting in a healthier population (Skovdal and Belton, 2014; Udjo 2017).

The available literature on the subject area mostly affirmed that Health aid improve health outcomes in developing economies (Mishra and Newhouse 2009; Shpak 2012; Mellaye and Yogo 2014; Chauvet *et al.,* 2008; Drabo and Ebeke 2011). Although, the literature is occupied with no robust consensus on how effective aid is in promoting economic growth. This accentuates from the complex tripartite (political, economic and social) forces at play in developing countries undermining the impact of aid projects in stimulating development. An armful of extant studies featured aid optimists who supported the evidence that aid culminates into growth, especially with good structural policy in place (Papanek 1973, Burnside and Dollar, 2000; 2004; Hansen and Tarp 2000; Karras 2006; Ogundipe and Ola-David 2016). However, some argued this assertion and concludes that development aid is not effective, as it undercuts economic development and political development in recipient countries (Brautigam and Knack, 2004) by encouraging corruption, rent seeking behaviour and eroding bureaucratic institution (Moyo 2009; Ali and Isse 2005; Knack 2001; Easterly 2006). In addition, aid scholars have hinged its ineffectiveness mostly on the fungibility nature of aid and lack of coordination among donors which allows recipient countries to divert funds outside donors' intended targets (Boone

1996; Pack and Pack 1993; Collier and Dollar 2012; Gebhard et al., 2008).

In spite of the mixed evidences on dichotomy of aid and growth nexus, Mishra and Newhouse (2009) posits that foreign aid has been instrumental to the provision of vaccines, eradicating deadly and preventable diseases, provision of medical services – which helped to save lives, following the delivery of large scale health interventions sponsored with funds from international sources. This evidence was corroborated following an influential study by Easterly (2006), he noted that in spite of the zero-growth payoff to aid in Africa, the aid intensive region has witnessed a fall in infant mortality and rising school enrollment. He concluded that some type of foreign aid might have actually had a positive effect on targeted sectors in Africa. In an attempt to empirically reconcile these conflicting strands, Bermeo (2006) and Gebhard et al., (2008) suggested that more research be conducted on the effectiveness of sector targeted aid in recipient countries. There are considerable numbers of theoretical and empirical evaluation of sector specific aid (Ogundipe and Ola-David, 2016) where the effect of health-targeted aid constitutes the bulk of the literature on sector specific aid in Africa (see Mishra and Newhouse 2009; Gebhard et al., 2008; Yousuf 2012; Wilson 2012; Mellaye and Yogo 2014). This present re-examination contributes to existing debate by disintegrating health-targeted aid into specific health categories; hence addressing irregularities in empirical analysis of the effectiveness of aid to specific sectors. Shpak (2010) reiterated 2010 Millennium Development Report of 2008 which illustrates that total health-targeted ODA to developing was more than US$18 billion.

Some of the several examples detailing evidences of health-targeted aid intervention in Africa include: national Diarrhea control programme in Egypt, Trachoma control programme in Morocco and national Guinea worm eradication programme in Sub-Saharan Africa. The Diarrhea control programme in Egypt costs $43million, of which 60 percent was sponsored by the US Agency for international development (USAID) while technical assistance was provided by United Nations Children's Fund (UNICEF) and WHO. The initiative led to 300,000 fever children death between 1982 and 1989. Also, with the financing support of UNICEF and international Trachoma initiative, incidence of Trachoma in Morocco fell by 75 percent and was completely eliminated in some provinces. In the same manner, Guinea worm reduction programme in Asia and SSA was jointly financed by the Carter center, UNICEF, WHO and the US centers for disease control and prevention. The initiative implemented the national guinea worm eradication programmes in twenty countries via their health ministries. The campaign project cost $87.4 million and prevented between 9million and 13million cases of guinea worm between 1986 and 1998.

In cognizance with the dismal performance of the Africa economies in attaining MDG 4 target, which aimed at reducing mortality in children by two-third of 1990 level in 2015 and the persistent health problems faced by developing Africa nations; it becomes expedient to disaggregate aid and assess the unique impact of the global institution efforts, in terms of specific components of health aid towards improving child survival. The existing debate on the effectiveness of health aid will be better situated by addressing the specific components of health aid. The disaggregated analysis will identify the varying weight and importance of the several components of health aid, hence ensuring project designs targeted at improving health outcomes in recieving countries are constructed to address specific health indicators and achieve measurable improvement as intended.

This study tends to justify the role of different categories of health sector specific aid and assess if their intended results of decreasing child mortality is achieved. The conceptualization is in the spirit of Mosley and Chen (1984) framework in arriving at a single/targeted variable outcome and the study adopts the System Generalized Method of Moments technique of estimation. The choice of the SYS-GMM is deemed fit as it controls for the problem of endogeneity prevalent in aid and institutions variables. The data for the study was sourced from the databases of World Development Indicators, UNICEF, and World Governance Indicators. The paper intends to lend credence to Africa government, policy analysts and decision makers, and international agencies on the relevance of health assisted programmes on child survival before and after the MDG intervention. This outcome enables an enhanced knowledge on the channels of aid disbursement and better conceptualization of the new sustainable development goals.

Literature review and theoretical framework

The effectiveness of aid in promoting development has long been debated. Recently, there has been a shift on the effect of aid from economic performance outcome to human development outcomes (Mishra and Newhouse, 2007). Theoretical perspective in support of the role of foreign aid on health outcomes argue that it results to increased availability, access, provision and consumption of health services (Shen and Williamson, 1999). Another perspective expands on this point, positing that aids initially relaxes the constraints on available resources hence leading to

higher availability, access, provision and consumption of health services (Bhutta, 2010). Theoretical perspectives against the effectiveness of aids on human development are based on the fungibility of aids, the improper targeting of aids and fragmentation in the sources of aids (Burguet and Soto, 2011). Also, the motive for giving aid, and the channels through which aid goes through all affect the effectiveness aid has in the recipients' country (Banchani and Swiss, 2014). Some of these perspectives have been scrutinized and intensly probed in the empirical literature.

A number of literature which studied the link between foreign aid and human development outcomes, have not established a clear positive association between aid and health outcomes as it is expected. Several authors have found that aid for development has been effective in improving health outcomes (Mallaye and Yogo, 2012; Chauvet and Mesple-esomps, 2008; Yogo and Mallaye, 2014; Banchani and Swiss, 2014). Some authors have also found mixed results on the influence of different categories of aid on health outomes (Burguet and Soto, 2011; 2012; Sebastein and Sergio, 2015). While Williamson (2008) find no significant effect on health outcomes, irrespective of the category of aid. Literature considered after the World War period (Willaimson 2008; Mishra and Newhouse, 2007) show both weak and no evidence of the impact of aid on several health outcomes. An explanation of this, is that aid after the world war period where majorly politically motivated; and such types of aid have minimal impacts in improving health outcomes (Banchani and Swiss, 2008).

Also, empirical literature which considered the period after the introduction of the millennium development goal show strong findings of a positive influence of health aid and health sector related health (Mallaye and Yogo, 2012; Chauvet and Mesple-esomps, 2003) on health outcomes, and weak evidence (Banchani and Swiss, 2014) and no evidence (Burguet and Soto, 2011; Sebastein and Sergio, 2015; Okon, 2012) of a positive influence of total aid on health outcomes. A plausible reason for this is that targeted aids are less politically motivated, less fungible and hence more specific in addressing the purpose of the aid. Also, since majority of the global causes of under-five mortality are infectious, targeted aids that address the situations around the underlying causes of mortality are more likely to have substantial effects on health outcomes irrespective of the quantity or amount of aid. Burguet and Soto (2012) findings demonstrate this point, showing that aid committed to STD/HIV control which is about 6 times the aid committed to malaria had lesser impacts on under five mortality than the impacts of aid committed to malaria control. Hence, these evidences tend to suggest that the amount and purpose of the type of aid, is more likely to determine the type and extent of impact aid has on health outcomes. Also, it suggests that for increased effectiveness, aids that are directed towards child health outcomes, should be aids that is able to address the major causes of under-five mortality and morbidity in a region.

Williamson (2008) argued that foreign aid (that is, aid to the non health and health sectors) is not effective at improving human development. This implies the potential of foreign aid to damage future growth potentials and opportunities. On the other hand, Banchani and Swiss (2014) argue that foreign aid to specific sectors (health related sectors) is more effective on maternal and child health and overall aid. Also, Banchani and Swiss (2014) using two-stage least square, fixed effects panel regression models and instrumental variable approach with data from OECD and WDI investigated the effect of different types of foreign aid on maternal health in low income countries. The study found that overall foreign aid had a little and significant negative influence on maternal health. Also, aid for reproductive health was found to be associated with larger reductions in maternal mortality.

Botting et al (2010) using unconditional logistic regression with data from OECD WHOSIS and UNICEF analysed the relationship between disbursed ODA, improved water source supply and infant mortality rate, child mortality rate in low income countries since the MDGs. The study showed that access to improved water supply has steadily developed since 2002, and that countries with the higher amount of aid for water supply and sanitation had odd ratios that ranged from 4 to 18 times than countries in with lower amount of assistance. Hence, they concluded that those countries could attain greater gains in access to improved water supply sources.

Burguet and Soto (2011) using two-stage least square and two instrumental variable approaches with data from OECD and WDI investigated if aid had any effect in child mortality. The study revealed that total aid had no statistically significant influence on the level of child death. An analysis of aid to several sectors shows that certain sectorial aid had a significant impact on child mortality. These effects are larger in high mortality countries such as SSA countries. Mallaye and Yogo (2012) using ordinary least square and Instrumental variable Estimates with data from OECD and WDI explored the effect of health aid on health outcomes in sub-Saharan Africa. The study showed that aid for health improves different health outcomes. More precisely, a unit

increase in the amount of health aid, increases life expectancy by 0.14, decreases the prevalence of HIV by 0.05 percent and decreases infant mortality by 0.17 percent. This influence operates specifically through improvement in female literacy level.

Similarly, Yogo and Mallaye (2014) evaluated the effectiveness of aid on primary education achievement in SSA. Using the fixed effect, two-way fixed effect, random effect, feasible GLS and instrumental variable estimate and data from Africa Development Indicators (ADI), the findings indicate that aid to education significantly increases the completion rate of primary. Using Data Envelopment Analysis (DEA), the study shows strong differences in the efficient use of aid. The use of aid efficiently is positively associated with the population size in urban centres, the development level, the quality of governance and the initial level of education.

Using fixed effect and instrumental variable estimate, Williamson (2008) studies the impact of aid to the health sector on life expectancy, infant mortality rate, death rate and access to DPT and measles immunization. The result indicates that foreign aid is not effective in increasing health and is an unproductive development assistance tool. Okon (2012) analyses the effect of foreign aid on human development in Nigeria. Using two stage least square, the outcome shows that the relationship between overseas development aid and human development is negative. The result implied that development aid worsens human development within the country.

Mishra and Newhouse (2007) investigates the influence overall aid has on infant mortality rate, the effect health aid through health expenditure has on the rate of infant mortality and the effect health aid has on infant mortality rate. Using ordinary least square and GMM estimation technique, the result showed that overall health aid has a statistically significant impact on infant mortality rate. This implies that doubling the amount of per capita health aid is related with a two percent decline in the rate of infant mortality. Sebastein and Sergio (2015) used the fractional estimation technique in estimating how neo-natal mortality rate, infant mortality rate and under-five mortality rate respond to total and sector aid. The study adopted panel data and controled for time-invariant effects, country-specific effects, endogeneity and measurement errors. The result shows that overall aid has no effect on child mortality, while health aid and agricultural aid have significant impact on child mortality. But that of agriculture is higher.

Drabo and Ebeke (2011) analyse the impact public spending, health aid and remittances have on health care services access in developing countries. Using instrumental variables estimates, they find that public spending, health aid and remittances are factors that determine access to health services in recipients' countries. Chauvet, Gubert, and Mespl e-Somps (2009), analyse the individual effect of aid, remittances and brain drain on child mortality. They find that remittances and aid for health reduce child mortality, with the impact of aid for health being more effective in poorer countries. On the other hand, brain drain has a negative effect on child mortality. Also, remittances reduce mortality of children from richer backgrounds than those from poorer backgrounds, while health aid is neutral in effect on both the poor and rich.

Burguet and Soto (2012) examine the relationship between aid directed different purposes and child mortality. The study finds that infectious disease aid for malaria and HIV/AIDS control has a statistically significant effect on under-five mortality during the period 2000-2010, while aid for the control of tuberculosis and other infectious diseases have no statistically significant effect on under-five mortality. Also, other forms of health aid lack significance on under-five mortality.

Data and methods

The study adopts a model previously used by Musgrove (1987) and adopted by Ogundipe, Olurinola and Ogundipe (2016). The model is an varied model of child mortality for a low income economy. The model evaluating the effect of health aid and child mortality in Africa is illustrated as:

$$U5MR = f(H\_aid\ \ H\_acs\ M\_hlt\ \ Ch\_nutn\ \ Cd\_prn\ \ GDPK\ EDU\ \ INST)\ldots\ldots(1)$$

The model in equation one can be stated in an explicit form as follows:

$$U5MR_{it} = \beta_0 + \beta_1 H\_aid_{it} + \beta_2 H\_acs_{it} + \beta_3 M\_hlt_{it} + \beta_4 Ch\_nutn_{it} + \beta_5 Cd\_prn_{it} + \beta_6 GDPK_{it} + \beta_7 EDU_{it} + \beta_8 INST_{it} + \varepsilon_t \ldots\ldots(2)$$

Where: $U5MR_{it}$ is the under-five mortality rate (per 1000 live births). H_aid_{it} is total health aid, H_acs_{it} is health access, M_hlt_{it} is maternal health, Ch_nutn_{it} is child nutrition index, Cd_prn_{it} is child diseases prevention index, $GDPK_{it}$ is GDP per capita, EDU_{it} is mothers' basic education, $INST_{it}$ is institutional quality, and ε_t: represents the random stochastic term.

Specifically, the study attempted examining the influence of disaggregated health aid on under-five mortality in Africa. This is pertinent to ascertain the

specific category of health aid that is more relevant in stimulating child survival in Africa. Examining this important relationship will be helpful for donors, African governments and decision makers in advancing aid effectiveness in the region. This is achieved using the model below:

$$U5MR_{it} = \beta_0 + \beta_1 H\_aid_{it} + \beta_2 H\_acs_{it} + \beta_3 M\_hlt_{it} + \beta_4 Ch\_nutn_{it} + \beta_5 Cd\_prn_{it} + \beta_6 GDPK_{it} + \beta_7 EDU_{it} + \beta_8 INST_{it} + \sum_{i=9}^{14} \beta_i (X_{it}) + \varepsilon_t$$

X_{it} is a vector, such that $X_t = \begin{Bmatrix} H\_aid\_ch_{it} \\ H\_aid\_mh_{it} \\ H\_aid\_ml_{it} \\ H\_aid\_tb_{it} \\ H\_aid\_oid_{it} \end{Bmatrix}$

Where $H\_aid\_ch_{it}$ is newborn and child health aid, $H\_aid\_mh_{it}$ is maternal health aid, $H\_aid\_ml_{it}$ is malaria aid, $H\_aid\_tb_{it}$ is tuberculosis aid and $H\_aid\_oid_{it}$ is other infection diseases.

The estimation technique adopted is the System Generalized Method of Moments (SGMM) which is centred on a dynamic panel data model with country fixed effects. This is necessary in order to overcome the problem of reverse causation inherent in the model. In this model, the lags of the predetermined and endogenous variables are used as instruments, to avoid the introduction of spurious correlations between the error term and variables. The SGMM is dynamic in nature and thus preferable to the static panel data models in which there are correlations between and among the regressors and the individual country effect and are typically estimated using the fixed effects (FE) estimator. The data used for the study were sourced from World Development Indicators, while data on aid and its various categories were sourced from Institute of Health Metrics and Evaluation (IHME) Database (see Table 1).

Table 1: Data source and measurement

Variable	Description	Measurement	Source
U5MR	under-five mortality rate (per 1000 live births)	It is measured as the probability per 1000 that a newborn baby will die before reaching age five.	World Development Indicators (WDI)
H_aid	Total health aid	This is captured as the total funds for health disbursed from source to channel to recipient countries.	IHME, 2015
H_acs	Health access	Developed as an index of human and physical facilities such as availability community health workers, nurses and mid-wives and government expenditure on health services.	WDI, 2015; Principal Component Analysis (PCA)
H_mtl	Maternal health status	Comprising an index of depth of food deficit, prevalence of anemia among pregnant women, availability of improved water and sanitation facilities.	WDI, 2015; PCA
Ch_nutn	Child nutrition index	captured as an index of the prevalence of severe wasting, weight for height (% of children under-5) and prevalence of stunting, height for age (% of children under-5).	WDI, 2015; PCA
Cd_prn	Child disease prevention index	captured as an index comprising vitamin A supplementation coverage rate (% of children ages 6-59 months); Measles immunization (% of children ages 12-23 months); DPT immunization (% of children ages 12-23 months) and use of insecticide-treated bed nets (% of under-5 population).	WDI, 2015; PCA
GDPK	GDP per capita	Constant 2010 US$	WDI, 2015
EDU	mothers' basic education	Captured using female primary school education enrolment rate.	WDI, 2015

INST	institutional quality	it is captured using the average of four institutional quality indexes provided by World Bank, namely: Control of corruption, Rule of law, Regulatory quality and Government effectiveness.	WGI, 2015
H_aid_ch	Newborn and child health aid	Total funds for health disbursed from source to channel to recipient country for newborn and child health.	IHME, 2015
H_aid_mh	Maternal health aid	total funds for health disbursed from source to channel to recipient country for maternal health (constant 2015 US dollars).	IHME, 2015
H_aid_ml	Malaria aid	total funds for health disbursed from source to channel to recipient country for malaria (constant 2015 US dollar)	IHME, 2015
H_aid_tb	Tuberculosis aid	funds for health disbursed from source to channel to recipient country for tuberculosis	IHME, 2015
H_aid_oid	Aid for other infection diseases	total funds for health disbursed from source to channel to recipient country for other infection diseases (constant 2015 US dollars)	IHME, 2015

Source: Compiled by authors

Results

The findings following the empirical analysis were presented in sequence in Tables 2-5 (See Appendix). Table two depicts the result of the relationship between child mortality and its determinants in Africa. There exists a significant inverse relationship between aid and under-five mortality; a 1% change in total health aid yields about 137% change in under-five mortality. The result shows that total health aid significantly decreases the prevalence of child mortality rate in Africa. This evidence was similar for health access, maternal health and child disease prevention while child nutrition posed reserve evidence, implying that child nutrition in Africa raises child mortality. Also, accessibility to health services and diseases prevention social services significantly reduces under-five mortality. A one unit increase in health access and disease prevention index dwindle under-five mortality by 0.63 units and 0.37 units respectively. In the same manner, maternal education was important in reducing child mortality, specifically basic primary education. The maternal education attainment reduces under-five mortality by 0.08 units. Alternatively, maternal health and child nutrition index contribute positively to under-five mortality in Africa. A one unit increase in child nutrition index and maternal health raise under-five mortality by 4.03 units and 2.59 units respectively. Also, per capital GDP and institutions pose a negative insignificant influence on U5MR in Africa. This would not be unconnected with the widening income equality and weak governance system in most developing African economies.

More so, the empirical analyses feature the disintegration of health aid into child health, maternal health aid, malaria control aid, tuberculosis support aid and other infectious diseases control aid. Among these categories, child health aid and maternal health pose the largest declining influence on U5MR in Africa. The readily available results show that a 100% change in aid targeted at improving child health and maternal health causes almost 73.2 and 100.6 units decline U5MR respectively.

Specifically, the result indicates that maternal health aid is the most important development assistance in reducing U5MR in Africa, as it exhibits on increasing returns to scale. This implies that a one unit investment in maternal health produce more than a unit return (improvement) in child health outcomes. In the same manner, other categories of health aid such as malaria control, tuberculosis and other infectious diseases significantly reduce U5MR in Africa. The result suggests that a 100% change in malaria control aid, tuberculosis and other infectious diseases result in about 38.8, 31.6 and 26.1 units decline in U5MR in Africa. Generally, the result in Table 1 shows that all categories of maternal and child health aid were significant determinants of U5MR in Africa.

The result in Table 3 reflects the role of socioeconomic crisis on the relationship between targeted-health aid and U5MR in Africa. A new interaction variable was developed to control for the influence of social-political crisis on health aid effectiveness. From the result available in Table 3, socioeconomic crisis integrated the effectiveness of health in improving child health outcome in Africa. The effectiveness of aid in reducing incidence of mortality slumped drastically from about 137.3% to 5.9% representing 27.4 folds reduction. This implies that socio-economic crises critically hamper the

effectiveness of health aid and this has contributed immensely to the alarming magnitude of under-five children death from preventable disease in Africa.
Also, health access and child diseases prevention (basic vaccines intervention programmers) were highly significant in reducing U5M in Africa. In the same manner, mother's basic education and per capita income exert an inverse variation on U5MR. Implying that mother's education/literacy tends to improves child health outcome, while per capita income exhibits same relationship, its effect is negligible. The result suggests that a 1% increase in per capita income significantly dwindles U5MR by a meagre of about 0.07%. Moreover, Table 3 also showed the effect of socio-economic interaction for other categories of child and maternal aid. Similar to the findings obtained for overall health aid, the effectiveness of child health aid, maternal health aid, malaria control aid, tuberculosis aid and aid for other infections disease in reducing child death incidence in Africa were mitigated. For instance, the effectiveness of child aid dwindled from 73.2% to 4% after controlling for the role of crisis. This implies that advent of socio-economic crisis in developing Africa economies reduces child health aid effectiveness by about 18.3 folds.

The result in Table 2 shows the role of institution in the health aid and U5M nexus in Africa. The study used a simple multiplicative approach to develop an interaction variable capturing how institutions impact on the relationship between health aid and U5MR. After adjusting for the role of institutions, all categories of child health and maternal health become less effective in dwindling U5MR in Africa. Specifically, the responsiveness of U5MR fell from about 137 units to about 39 units to a 100% change in total health aid. This implies that institutional weakness in African economies causes about 3.6 folds decline in the effectiveness of aid for health in reducing under-five mortality rate in Africa.

In the same manner, the interaction variables were generated for the disintegrated components of health aid. As highly observed above, controlling for institution mitigated the effectiveness of all aid categories. Specifically, the responsiveness of U5MR to the child health aid and maternal health aid declined by 1.57 and 1.66 folds respectively. Also, accounting for the weak institutional quality in most African economics completing rendered tuberculosis aid and other infectious diseases ineffective in influencing child health outcome in Africa.

Discussion

The total aid disbursed for health in Africa was important in reducing under-five mortality rate. This actually depicts the essence of aid, as international donors target to improve health status in target countries. One important indicator of health status of a nation is the extent of prevalence of under-five mortality. The proponents of this ideology suggest that the health development at this formative age go a long way to determine the wellbeing and the productivity of labour at the later years. Specifically, this study found that health aid has more explanatory power and significantly reduces under-five mortality in Africa, more proportionately than other explanatory variables in the model. Put differently, under-five mortality rate in Africa was more responsive to health aid. This evidence portrays the central argument for development assistance, as it helps to address finance gap in addressing socio-economic challenges. The literature has featured similar evidences depicting the fact that foreign aid has been effective in stimulating improvements in health outcomes (see Mallaye and Yogo 2012; 2014; Banchi and Swiss 2014). Similarly, other indicators of under-five mortality such as health access, maternal health and diseases prevention index improve child health outcomes in the region. The health access which measures the availability of human and physical health amenities plays a critical role and reduces the volume of incidences when health services are available in their right quantity at the appropriate time (Wusu *et al.,* 2016). The commitment to reduce health status is likely to be achieved when necessary authorities provide adequate facilities to ensure everyone in need of healthcare services have unhindered access in its appropriate measure.

Likewise, the health of mothers significantly reduces the incidence of under-five mortality, implying that the mother's health status can directly affect that of the child. A healthy mother is most likely to have a healthy child (Solanke *et al.,* 2018). The mother's health status is adjudged critical to the wellbeing of the child because the nutrients required for neonatal and post natal formative development are derived from the mother. The incidence of deficiency and malnutrition in African Children has been linked to the critical deficiency of calcium in the breast milk of African mothers. In the same manner, commitment to disease prevention measures such as ensuring wider coverage for vitamin A supplementation, immunization against measles, immunization against DPT, the use of insecticide treated bed nets, and availability of safe water and sanitation facilities reduce the incidence of child death (Banda *et al.*, 2017). When these diseases prevention amenities are available, easily accessed and adhered to periodically as prescribed; the chances of diseases infections and contraction are minimized, hence improving both maternal and child health.

On the other hand, lack of adequate and required nutrients, as indicated in the empirical results, worsens child health outcome. This is not surprising as theoretical evidences on studies in the developing economies actually claimed that malnutrition is a critical underlying factor for child deaths (Banda *et al.,* 2017). When required nutrients are deficient in their specific volume and right combination, it hampers the health and development of a child; hence posing threat for child survival.

Interestingly, the relevance of this study is premised on its unique approach of disaggregating health aid into five main components, namely: child and newborn health aid, maternal health aid, malaria control aid, tuberculosis support aid and other infectious diseases control aid. This was performed in order to limit the aggregation bias apparent in extant studies. Following the empirical evaluation, health aid with specific target on child and newborn, and maternal health was found most relevant and important than other categories of health aid. This evidence is not farfetched, as this category of health aid addresses the specific needs and the (underlying factor sprouting) preventable life-threatening diseases that accounts for child deaths in Africa. Also, maternal aid will improve the health status of women and would address their preconception health status which helps to reduce risk factors and ensure healthy child health which is necessary for sustainable child health (Oyero and Salawu, 2018; Abioye *et al.*, 2017, Amoo *et al.,* 2013).

Conclusion and recommendations

This study attempts to empirically capture the effects of targeted health aid on health outcomes in Africa, one in which has been suggested that interventions may have led to quantifiable improvements. We also sub-group total health aid inflows into specific health areas such as health aid for child and newborn, maternal health aid, malaria health aid, tuberculosis targeted aid and health aid targeting other infection diseases; this in a bid to assess a comprehensive influence of targeted health development assistance on the health of the population in the recipient African country. The identification strategy employed was based on dynamic panel data estimator using the Roodman's specification of generalized method of moments, due to its inherent ability to account for endogeneity of some regressors.

The outcome of the empirical investigation reveals that aid for health has been effective in stimulating child survival in Africa. The study confirmed the assertion of health aid optimist that it must have contributed to some improvements in Africa's development. In the same manner, health aid was effective in improving child survival when controlled for institutional quality, though the magnitude of its impact declined. This could not be unconnected with the widely adjudged weak institutional quality in SSA countries and can represent a cogent factor limiting the effectiveness of health aid despite the massive health-targeted project aid influx into the region. Consequently, this study found that the prevalence of violence, terrorism and political instability are detrimental to the effectiveness of aid in the region. The prevalence of instability (social, political and economic) weakened the effectiveness of health aid by about 80 percent in the region. Furthermore, specific health-target aid including health aid targeted at child and newborn, maternal health and malaria control were particularly important in dwindling child mortality while the outcomes tuberculosis and other infection diseases health-targeted were not significant. In consonance with the total health-target aid, the effectiveness of sub-categories was equally mitigated by institutional quality and instability.

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Table 3: Health Aid Regression

Variables	(1) u5mr	(2) u5mr	(3) u5mr	(4) u5mr	(5) u5mr	(6) u5mr
L.u5mr	0.934***	0.931***	0.952***	0.962***	0.904***	0.908***
	(0.0278)	(0.0288)	(0.0323)	(0.0292)	(0.0116)	(0.0169)
loda_t	-1.373***					
	(0.451)					
h_acs	-0.635*	-0.687*	-1.262***	-0.859***	-0.314	-0.398
	(0.329)	(0.383)	(0.459)	(0.317)	(0.393)	(0.353)
m_hlt	2.594*	2.869**	3.299**	2.134	-2.303**	-0.904
	(1.541)	(1.407)	(1.436)	(1.775)	(1.074)	(1.616)
ch_nutn	4.032	2.643	2.888	2.605	3.607***	5.203***
	(3.283)	(1.830)	(1.899)	(1.930)	(1.243)	(1.565)
chh_prn	-0.377**	-0.479***	-0.401***	-0.257	-0.100	-0.291*
	(0.183)	(0.156)	(0.133)	(0.199)	(0.128)	(0.155)
Gdpk	-0.000131	-0.000694	-0.000731	0.000529	-0.00156***	-0.000401
	(0.000752)	(0.000856)	(0.000599)	(0.000956)	(0.000527)	(0.000561)
Pri	-0.0846***	-0.0827***	-0.0833***	-0.0394	-0.0743***	-0.0679***
	(0.0242)	(0.0283)	(0.0314)	(0.0250)	(0.0103)	(0.0187)
Inst	-2.418	-3.452	-4.929	-7.748***	-0.874	-4.928**
	(2.622)	(2.849)	(3.127)	(2.421)	(1.108)	(2.083)
Time	0.410**	0.231	0.437**	0.309		
	(0.208)	(0.217)	(0.182)	(0.231)		
loda_ch		-0.732**				
		(0.330)				
loda_mh			-1.006***			
			(0.367)			
loda_ml				-0.388**		
				(0.156)		
loda_tb					-0.316***	
					(0.115)	
loda_oid						-0.261**
						(0.114)
Constant	-882.6**	-514.5	-931.4**	-677.4	4.190	-47.11**
	(434.3)	(451.7)	(374.4)	(465.2)	(20.42)	(18.54)
Observations	248	248	248	244	232	248

Number of id	26	26	26	26	26	26

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 Source: Computed using Stata 13.1

Table 4: Health Aid (interacted with Institutions)

Variables	(GMM) u5mr	(GMM) u5mr	(GMM) u5mr	(GMM) u5mr	(GMM) u5mr	(GMM) u5mr
L.u5mr	0.958***	0.958***	0.946***	0.942***	0.942***	0.928***
	(0.0331)	(0.0356)	(0.0425)	(0.0198)	(0.00627)	(0.0207)
loda_t_inst	-0.393***					
	(0.110)					
h_acs	-0.851**	-0.785**	-0.787**	-0.401	0.112	-0.614
	(0.416)	(0.384)	(0.308)	(0.461)	(0.192)	(0.586)
m_hlt	0.304	-0.0858	-0.503	-1.827	-1.577*	2.109*
	(1.090)	(1.415)	(1.351)	(1.474)	(0.899)	(1.199)
ch_nutn	0.651	0.585	-0.695	1.601	-1.092**	-0.0650
	(1.462)	(1.975)	(1.643)	(2.082)	(0.505)	(1.805)
chh_prn	-0.505***	-0.454**	-0.357***	-0.955***	-0.630***	-0.553***
	(0.107)	(0.220)	(0.136)	(0.113)	(0.145)	(0.138)
Gdpk	-0.000240	-0.000437	-0.000188	-0.000834	-0.00104***	-0.000630
	(0.000613)	(0.000524)	(0.000990)	(0.000659)	(0.000296)	(0.000888)
Pri	-0.0254	-0.0300	-0.00342	-0.00106	-0.0197*	-0.0640***
	(0.0303)	(0.0313)	(0.0353)	(0.0370)	(0.0111)	(0.0242)
Time	0.135	0.159	-0.0790	0.0596		
	(0.141)	(0.188)	(0.164)	(0.108)		
loda_ch_inst		-0.466***				
		(0.157)				
loda_mh_inst			-0.605***			
			(0.103)			
loda_ml_inst				-0.446***		
				(0.136)		
loda_tb_inst					0.00333	
					(0.0342)	
loda_oid_inst						-0.282
						(0.260)
Constant	-262.5	-304.5	197.7	-86.21	64.98***	-3.532
	(280.9)	(372.5)	(328.2)	(230.0)	(16.06)	(19.71)
Observations	248	248	248	244	232	248

Number of id	26	26	26	26	26	26

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 Source: Computed using Stata 13.1

Table 5: Health Aid (interacted with socio-economic indicators)

VARIABLES	(1) u5mr	(2) u5mr	(3) u5mr	(4) u5mr	(5) u5mr	(6) u5mr
L.u5mr	0.930***	0.940***	0.944***	0.933***	0.905***	0.912***
	(0.0154)	(0.0144)	(0.0156)	(0.0174)	(0.0133)	(0.0139)
loda_t_psv_2	-0.0587***					
	(0.0171)					
h_acs	-0.405**	-0.650***	-0.801***	-0.255	-0.126	-0.158
	(0.206)	(0.179)	(0.209)	(0.272)	(0.384)	(0.247)
m_hlt	-1.289	-1.236	-1.297	-1.570	-3.062**	-2.656*
	(1.019)	(1.060)	(1.143)	(1.282)	(1.216)	(1.548)
ch_nutn	1.890	0.678	1.105	-1.693	4.204***	5.037***
	(1.523)	(1.393)	(1.512)	(1.520)	(1.555)	(1.857)
chh_prn	-0.765***	-0.718***	-0.739***	-0.844***	-0.222*	-0.792***
	(0.113)	(0.103)	(0.127)	(0.155)	(0.122)	(0.125)
Gdpk	-0.000708**	-0.000790***	-0.000841***	-0.00151***	-0.00163***	-0.000781*
	(0.000326)	(0.000272)	(0.000241)	(0.000449)	(0.000590)	(0.000431)
Pri	-0.0374***	-0.0225**	-0.0249***	-0.0132	-0.0800***	-0.0632***
	(0.0119)	(0.00925)	(0.00943)	(0.0102)	(0.0147)	(0.0124)
Time	-0.0394	-0.0279	0.0206	-0.0945		
	(0.0956)	(0.0910)	(0.0976)	(0.0888)		
loda_ch_psv_2		-0.0400***				
		(0.0111)				
loda_mh_psv_2			-0.0459***			
			(0.0150)			
loda_ml_psv_2				-0.0227		
				(0.0206)		
loda_tb_psv_2					-0.0803**	
					(0.0333)	
loda_oid_psv_2						-0.0998***
						(0.0246)
Constant	105.9	102.1	1.479	278.5	7.150	-1.354
	(197.1)	(188.5)	(201.6)	(185.2)	(17.12)	(21.44)
Observations	248	248	248	244	232	248

Number of id	26	26	26	26	26	26

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source: Computed using Stata 13.1